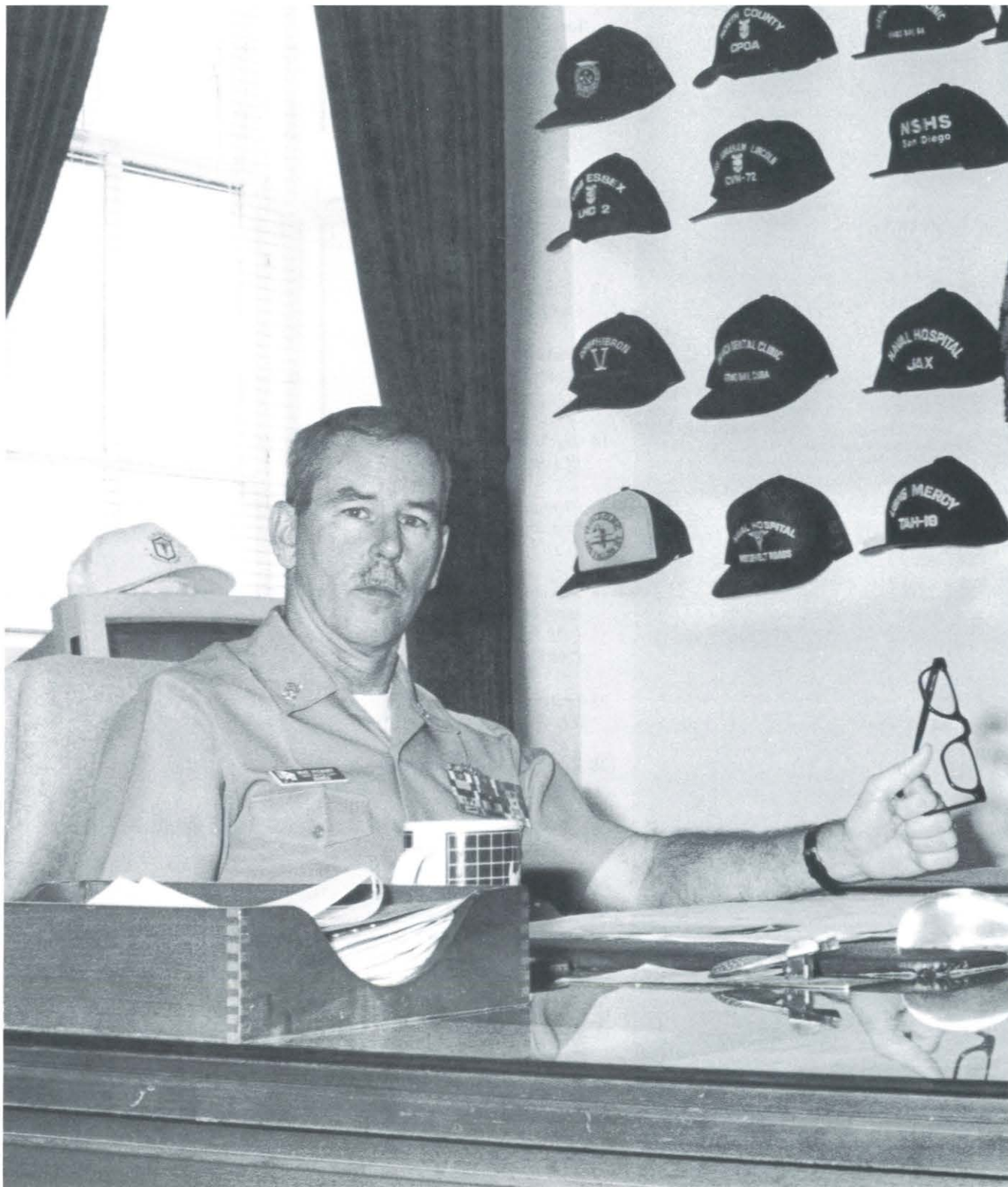


# NAVY MEDICINE

## September-October 1995



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*NAVY MEDICINE*, Vol. 86, No. 5, (ISSN 0895-8211 USPS 316-070) is published bimonthly by the Department of the Navy, Bureau of Medicine and Surgery (MED 09H), Washington, DC 20372-5300. Second-class postage paid at Washington, DC.

POSTMASTER: Send address changes to *Navy Medicine*, Bureau of Medicine and Surgery, ATTN: MED 09H, 2300 E Street NW, Washington, DC 20372-5300.

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*NAVY MEDICINE* is published from appropriated funds by authority of the Bureau of Medicine and Surgery in accordance with Navy Publications and Printing Regulations P-35. The Secretary of the Navy has determined that this publication is necessary in the transaction of business required by law of the Department of the Navy. Funds for printing this publication have been approved by the Navy Publications and Printing Policy Committee. Articles, letters, and address changes may be forwarded to the Editor, *Navy Medicine*, Bureau of Medicine and Surgery, ATTN: MED 09H, 2300 E Street NW, Washington, DC 20372-5300. Telephone (Area Code 202) 762-3244, 762-3248; DSN 294-3244, 294-3248. Contributions from the field are welcome and will be published as space permits, subject to editing and possible abridgment.

For sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402.

NAV MED P-5088

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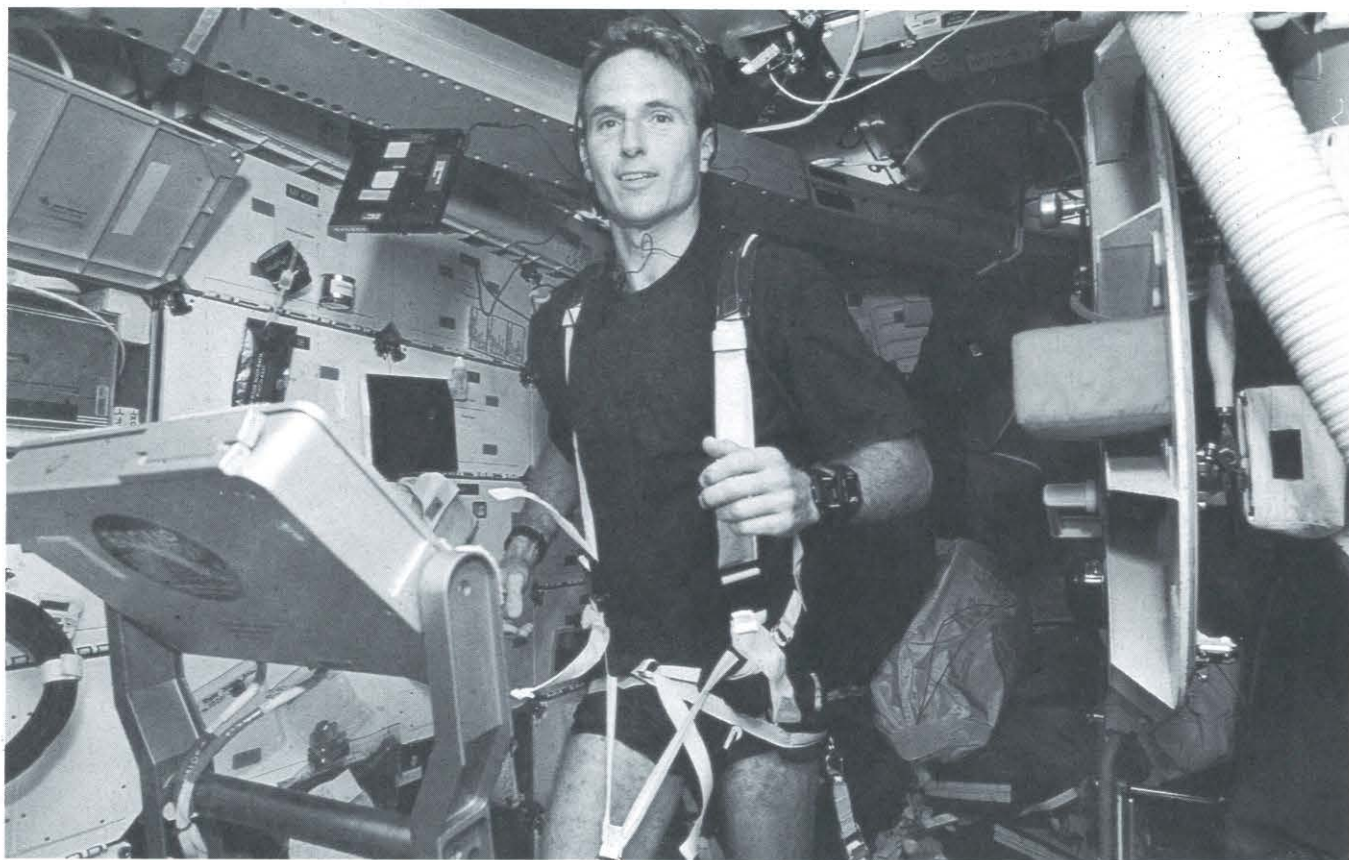
## A Look Back

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**COVER:** HMCM(SS) Mike Stewart, Force Master Chief of the Navy Medical Department and Director of Medical Department Enlisted Personnel, speaks on enlisted issues. Interview on page 6. Photo by HM3 Alywin M. Bristol, NNMC Bethesda, MD.



# Navy Medicine's Shuttle Doc



NASA photos

Linenger works out on the new extended duration orbiter treadmill. A floating CD player provides musical entertainment.

*The July-August 1995 issue of Navy Medicine featured Part I of an interview with CDR Jerry Linenger, Navy flight surgeon and shuttle astronaut. Having just achieved earth orbit following a thrilling ride into space, Linenger and his fellow crewmembers were ready to begin their work.*

**Once you were safely in orbit it was time to focus on projects, and there were a lot of those.**

Yes. Every mission is pretty well jammed and ours was jammed more than most.

**You were responsible for the medical experiments, the treadmill, the rower evaluation, and a back pain experiment.**

A lot of these experiments have to do with countermeasures for long-duration flights. You have to keep your musculoskeletal system intact and functioning so that when you

come back to earth you can respond to 1 G again. It's also a mental refreshment to run or do some kind of exercise. For the back pain experiment we simply measured people. After the first day, everyone grew about an inch. The next day, everyone grew about 2 inches. At that point, I thought that after a 10-day flight we could go back and play for the Houston Rockets. But it pretty much leveled out after 2 inches. It seems that 2 inches growth per person is the standard up there.

Linenger talks to schoolchildren on earth during the mission's SAREX-II (Shuttle Amateur Radio Experiment).

With no compression on your discs, things just stretch out. And because of that, a lot of people experience back pain in space. So the experiment really was to look at growth rate, to see just how much the spine expands. I would ask a few basic questions such as the type and severity of the pain, the location, etc. I'd say having a trained physician aboard who is used to looking at these kinds of things is an advantage.

I was also responsible for the long-duration treadmill. The Russians have found it a very successful counter-measure and they insist that the people in their space station, especially the last few days before they come back, work out hard on the treadmill to keep their orthostatic tolerance up. The Russians actually exercise about 3 hours a day all the time they're up there. It's a basic requirement.

With our space station coming, we're becoming more concerned about these long-duration flights so we have developed a new treadmill. There's a fun part to this. The orbiter goes around the earth every 90 minutes. I knew I could run for 90 minutes. I've done that before. So the last few months before the flight I decided I needed to get on some treadmills and make sure I could run for 90 minutes. One of my secret goals when I got up there was to run around the world. I figured not too many people have done that. As soon as I had the opportunity, I set my watch and started off. The next time I needed a witness, I got Carl Meade, one of our crewmates, to watch.

**What kind of footwear do you have when you're doing it?**

Regular tennis shoes. When you



first start using the treadmill, the soles of your feet feel like pins and needles more intensely than you've ever felt. You haven't had anything pushing on the bottoms of your feet and when you strap yourself down and start walking, it feels like your walking on nails.

It took me about 10 minutes to get my legs warmed up to the point where I could run. For the first 10 minutes I was totally stiff and cramping. I kind of walked and just tried to get going. This was my warmup period. But then at 10 minutes, I could almost envision my capillaries opening. Just like that, the blood vessels opened up

and the muscles got the oxygen. At 10 minutes, suddenly I was back to normal.

**How does the new treadmill work?**

You want to stress the bones and the musculoskeletal connections such as tendons. One of the biggest problems that hasn't been resolved for long-duration flight is calcium loss. Although other systems seem self-limiting, calcium keeps leaving the bones. You seem to lose muscular strength to a certain point and then it levels out. Most of the other physi-



ological changes adjust and they just sit there. Calcium keeps leaching out the whole time. One of the keys is to get force on your legs and on the bones. In my case, I weigh about 160 pounds and so we had some straps with load plates attached to either end of the treadmill. We have a little display panel on which you can put in your weight and adjust the load of these two load plates which pull down on the straps. The straps go over your shoulders and also around your hips. You mainly pull from your hips and yank your body down into the treadmill. I could run forever in space. There's nothing to react against and so you're not getting any exercise. Unless you pull yourself down to where you are simulating your body weight and getting pushed into the treadmill, it's kind of worthless trying to run. And I had my CD player floating nearby playing some Bruce Springsteen keeping me going. The treadmill was so realistic that at one point I closed my eyes and it felt like I was running on earth.

#### **How did you adjust to zero G while on the mission?**

The only clumsiness I had was that I'd push too hard at the beginning. After awhile you realized that you could push off a bulkhead just with your fingertips and float across the module. There's nothing physical you need to do up there as far as your strength. There's really no demand on your muscular system so you need to exercise. I used a number of pulleys and some of these stretch bands you use in rehab medicine. My feeling is that it was all beneficial from two aspects. Physically, it keeps your musculoskeletal system together. I had the heart watch monitors on and I was able to get my pulse up to about 185 when I was running, which is a good cardiovascular workout. When

I was really going all out in a good hard run, the people on the flight deck called down and said, "All right Jerry, we're trying to take some photographs and the cameras are vibrating all over the place." I could literally shake the vehicle when I ran hard.

#### **What was the orthostatic experiment all about?**

We hook some EKG leads and a Halter monitor up so throughout the landing when you're pulling Gs, we can see what's going on. Also while in space, your body adapts by dumping fluid so you need to drink a lot of fluids and take salt tablets; it's called fluid loading. But after landing, the first thing we wanted to do within the vehicle was to record on the Halter monitor standing up and see how the pulse responded to see if you were orthostatic, that is whether you were low on fluids. We were able to record that and see how the body responded immediately after landing. We had all this equipment on under our reentry suits. As soon as we landed, one of the first things I did was to get out of my belt again and stand up and do a stand test and see how my cardiovascular system responded to being back in 1 G.

#### **Did you have any special medical equipment on board?**

Yes. On all flights, two people are trained as ship's "surgeons." In some cases there is no physician aboard. In this case, I was the obvious pick for ship's surgeon. We take up a pretty well-equipped locker with medications. I had my stethoscope, blood pressure cuff, some intubation equipment, etc. If we had a problem we could call a private medical conference down to the flight surgeons who are sitting in Mission Control, and I'd describe what was going on. We'd put our heads together and decide on

the best course of action and act accordingly. Every day we had a private medical conference where we got off line and talked to the flight surgeon and discussed how the crew was doing and what medications we'd like to use.

#### **If there's no flight surgeon aboard, someone is then trained to do rudimentary care.**

That's part of that 1 year of training. In my case Dick Richards, a Navy pilot, was the backup doctor and we had a number of training sessions. I always joked to Dick that it would be okay if anybody else got sick but I really didn't want to get sick while I was up there with Dick being my doctor.

#### **What about the motion sickness situation? Sixteen years ago I interviewed Joe Kerwin, your Navy predecessor on the Skylab mission, and he was using a combination of scopolamine and dextedrin, Scopex, they called it.**

You have to call it space motion sickness because it's a different kind of motion sickness. Being in aviation, I've seen a lot of problems with the motion sickness pilots get, especially rookie fliers down at Pensacola. This is a different animal. The Scopex that Joe described back then is still one of the better things we use. We try to use it prophylactically. I took Scopex on the pad before we launched and had absolutely no symptoms. Whether I would have without it, I don't know. Other people take it and still have the problem. Once you're up there you try different medications and there's no consistent answer. Some people respond to them, some don't. Some people go beyond the normal 2-day course of the illness and still don't feel well the whole flight.



**Joe Kerwin told me the toughest thing was trying to predict who would get sick in space. Apparently, we haven't made a lot of progress since then.**

That's true. It's still very hard to predict who will have a problem. You'd think the "Vomit Comet" would be a good indicator but there's no correlation. Some people could be sick on that thing every time they go. They go in space and they feel fine. In my own case, I was very happy that I felt great from the start. And on earth, I don't have an iron stomach or iron head. If you do enough to me you can make me feel bad.

With the motion sickness thing, as the flights get longer and longer it maybe won't be that big of a deal. If you think of a flight lasting 5 days and

people aren't feeling good for 2 days, that's a big deal. If a flight lasts for 3 months and you don't feel perfect the first couple of days, maybe we can live with that.

**Did you notice a change in sleep patterns while you were up there?**

The day-night is very strange because you don't have the day-night cues. Up there, you have day-night every 45 minutes. I slept down on the middeck wall. Someone else slept on the ceiling. We all had our different spots. One guy floated around the whole night. Down in the middeck it's a little darker. In the flight deck we put some shades in the windows to try to make it dark artificially. You would find that late in the day you felt yourself getting sleepy when you went

into darkness. And 45 minutes later when you were in daylight working up on the flight deck you felt awake again. Your body rhythms really didn't know what they were doing. But once I secured myself down, put a little velcro over my head, strapped my chest down, and held myself against the wall, I closed my eyes and slept like a rock. Not everyone has that experience. Sleeping medications are not uncommon.

**Tell me about reentry.**

Reentry for me was the biggest surprise of the whole flight. As I said, we do lots of simulations of everything but you can't recreate the thunder, the pounding, and getting the Gs pushed into you at launch. Reentry is something most people don't think



Shuttle commander Dick Richards looks out overhead window. This photo was taken by one of the EVA crewmen.

much about. The shuttle looks like a airplane coming in. In fact, it's still a capsule coming through the fiery atmosphere, only now the thing has wings. At reentry you're going 17,500 miles per hour and you have to go down to zero. You start that process by doing a burn. In our case we did that near Australia. Once that burn is accomplished, you no longer have engines to help you. The only engines are the ones that work in space. It's a dead stick landing all the way. Once you do that de-orbit burn, you de-orbit. And secondly, you are picking out a spot 4,000 miles away, in our case, at Edwards Air Force Base and you've got to hit it. You have to burn for x number of seconds precisely so you hit that target. You're basically a brick coming into Edwards. You're coming in at a 20-degree glide slope. Normal landings are about a 3-degree glide slope so you can imagine the shuttle looks like it's heading for a crash landing.

At the time of burn, the shuttle is turned around heading backwards. It was daylight so I could see outside. The reaction jets fire to get you lined up properly. Then the jets fire into your velocity vector to slow you down so you can reenter. When those things fire it sounds like a cannon going off. Boom! Boom! Boom! Then you flip the vehicle back over. When you begin hitting some air molecules you have a fireball going. In the overhead window there was a huge plasma of orange-glowing gases flying back there. In my case, it sounded like a freight train was right behind us going about 125 miles an hour. I knew it wasn't but I had to take a look anyway. I turned around and said, "Nope, no freight train." Your instinct tells you to get out of the way.

You begin shaking again and begin to feel the Gs. You have a G-suit on inside your launch and reentry suit so you pump that up to get a little pressure on your legs to keep the blood going up to your brain so you don't black out. At this point we were going about Mach 15, 15 times the speed of sound and getting low enough to see clouds whizzing by. The clouds were whipping by like blurs.

The touchdown itself was very smooth. Dick Richards, our commander, just kissed the runway, a nice soft landing. It was beautiful. The parachute came out, the rollout was a lot smoother than I expected.

#### **How did you feel once you stopped?**

That was a "We won the Super Bowl" kind of thing. The whole crew had that sigh of relief and a scream, "We made it!" Of course, at that point I had that orthostatic experiment I described. I had to get my Halter going again and take some measurements of how my body was responding cardiovascularly. Actually, I felt pretty good inside the vehicle.

Then they brought out a medical van which we entered for about 4 hours of medical experiments. They put you on a bicycle ergometer. There's another experiment in which they shine a laser beam into your peripheral vision. You do some tracking tasks with your eyes to see if you have more lag. Your whole balance system is a little different so they look at that with a balance beam test. They put you on a floor that keeps moving and the scenery keeps moving. The floor moves and they see how stable you are. In space, the middle or inner ear can't do its thing because there's no gravity pulling down on things.

After that 4-hour ordeal, I was definitely ready to go to bed.

#### **Where are we headed in the space program?**

I think we're headed toward international crews, cooperation among countries, and that includes the Russians. At this stage, I think the space program is very valuable in helping to break down boundaries between countries. We always talk about the view from space where you don't see boundaries between nations. It's one planet and it will be the people of Planet Earth who will be out exploring space. And we're doing that. In the near term, we have rendezvoused with the MIR space station. The next step will be to dock with MIR and gain some experience.\* This is the phase that is going on right now. After we pick up that experience the next phase will be to launch the international space station. The partners in that are the European Space Agency, the Japanese Space Agency, Canada, the United States, and Russia. It truly will be an international effort.

Since my flight, people ask me what I've been up to. I've been learning the Russian language, a full-time crash course. We've learned from the experience of Joe Kerwin and his crew who did the space station stuff on the Skylab back in '73. We are getting back into that kind of operation but this time with a lot more sophistication.—JKH

*See page 12 for related story.*

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\*Last June, Shuttle *Atlantis* docked with MIR. Astronaut Norman Thagard and two Russian cosmonauts, who had spent 4 months in space, transferred to the shuttle for return to earth. Two fresh cosmonauts who had ridden *Atlantis* into orbit transferred to MIR to take their turns in the Russian space station. Seven additional Shuttle-MIR dockings are scheduled.



# HMCM Mike Stewart Speaks on the Issues

**O**n 29 July 1994 Michael Stewart became the sixth Force Master Chief of the Navy Medical Department and Director of Medical Department Enlisted Personnel. He enlisted in the Navy in 1968 and, after becoming a cast room technician, went to Vietnam in November 1969. He spent a year with the Third and First Marine Divisions serving with the First Battalion/Ninth Marines and Recon Battalion. Upon returning to the United States, HMCM Stewart became both a surface and submarine independent duty corpsman and served aboard USS Douglas (PG-100), USS Dixon (AS-37), USS Nathan Hale (SSBN-623) (Blue), USS Nautilus (SSN-571), and USS Casimir Pulaski (SSBN-633). He was promoted to master chief in May 1987 and completed tours as the Command Master Chief of Naval Clinics Command, San Francisco, CA; Naval Medical Command, Northwest Region; Naval Hospital Oakland, CA; and National Naval Medical Center, Bethesda, MD.

Navy Medicine recently spoke with HMCM Stewart in his office at BUMED.

**Unlike your predecessors, you wear two hats, both that of the Director of the Hospital Corps and the Force Master Chief.**

When I took this job we did something new. We merged two codes, the Force Master Chief job and the Director of the Hospital Corps. We immediately changed the title from the Di-

rector of the Hospital Corps to Director of Medical Department Enlisted Personnel so that it encompassed the 3,400 dental technicians and 2,000 nonmedical enlisted in addition to the 27,000 hospital corpsmen. I am the advocate for *all* of them. As the Force and the Director, it puts me in a unique position. The heritage the previous Force Master Chiefs left behind allows me to do this job. We've had master chiefs who served briefly as Director and we had master chiefs who were the Force, but never one to be both.

**What's the division of responsibility between your two hats—Director of Medical Department Enlisted Personnel and Force Master Chief?**

The Force is the representative of the enlisted personnel to the Surgeon General and to the Master Chief Petty Officer of the Navy. The Director is responsible for the training, sizing, advancements, creation and deletion of NECs, etc.

**What are some of the current issues you are concerned with in the Hospital Corps?**

One of my chief concerns for all the enlisted assigned to Navy medicine is our readiness posture. Are we really trained to do what we're asked to do? We must ensure that all our enlisted people—corpsmen and dental techs—are really trained for the platforms we ask them to go to, whether it be with the Marines, with a

gray hull, with the Seabees, or submarines.

Another big issue is whether we have the right number of people within the NEC structure. We are looking at doing billet reviews on every NEC to make sure we're really training the right number of people. In some of the NECs we have been training the same number for years without stopping to see whether our requirements have changed. We've decommissioned a lot of ships and submarines with the downsizing of the Navy. Are we spending money on training the way we should be? Are we meeting the needs of the customers—the doctors, nurses, and certainly our patients?

**Are there any NECs that have shortages right now?**

The independent duty corpsmen billets for submarines and surface ships are very critical as well as recon corpsmen, SEALs, and preventive medicine technicians. We are placing a great deal of emphasis on recruiting these specialties. We are also in the process of surveying these technicians about job satisfaction.

**Why would the submarine independent duty billets be critical if we are decommissioning so many submarines right now?**

People are still very interested in that NEC but it is a very difficult school and that may have scared some people off. Independent duty school for submarines and surface ships has



always been a peaks and valleys situation. Sometimes we've had a lot of students and other times not very many. But we are working on it. Our IDCs have tremendous responsibilities and work unbelievable hours. The health of the crews they serve rests squarely on their shoulders. Not everyone is cut out to do what they do. We must continue to recruit bright, motivated corpsmen to meet this need. We will always have these IDC platforms and that means we must constantly train new people.

**Downsizing is a big issue and is affecting everyone in the military. Are you starting to think in terms of numbers?**

We're thinking in terms of numbers but to be honest it's a fast moving target and seems to change almost weekly. When we lose a ship or an aviation squadron, we lose those medical billets and that makes perfect sense. When we close a naval hospital we are now losing those billets as well, phased over a 2- or 3-year period such as with the closing of Naval Hospitals Orlando or Oakland. We are going to lose those billets but it will be 2 or 3 years from now and we will lose them

by attrition. We are trying to determine medical end strength based on readiness, and that is based on operational medicine. This is being determined by a manpower model known as Total Health Care Support Readiness Requirement (THCSRR). The model is still being worked and it's still "wet paint" if you will.

**How does someone in your position and with your responsibility maintain esprit de corps and the morale of an organization in which people are losing their jobs?**

That's a very tough question and it's something our leaders—officers and enlisted—must deal with every day. Because of downsizing and high retention our opportunity to advance is very slow. As a result, some very talented people who were not selected are getting out. We continue to try to remind people of what we're paying them to do which is providing medical care for the greatest military in the world, the best Navy on the globe. Unfortunately, that rationale wears thin after a while. When you are trying to get promoted and people continue to tell you to keep working for God and country—which are pretty

good reasons—you still have to take care of your family. We must find ways to be more creative in giving people jobs that are more meaningful. I do feel strongly that our advancement percentages will increase very soon. It's very important that people don't give up. The logjam is going to break soon.

**With downsizing, is there any thought of closing one of the corps schools?**

We are looking at closing the corps school at San Diego and merging it with Great Lakes to have one large corps school instead of two. We will gain some economy of instructors. We will know that every "A" school student is trained exactly the same. We will bring people directly from the military environment of boot camp right into corps school. That will help reemphasize the military bearing of the Hospital Corps.

We're also looking at the "A" school curriculum. Navy medicine is doing some wonderful things with technology such as with telemedicine and computers aboard our deployable units, those types of things. We need to teach some computer skills in "A" school because it would be advantageous if when an "A" school student graduates and goes to their first duty station, they know some computer technology, because that's where Navy medicine is going. Why not then give them the foundation in "A" school?

The whole nation is shifting from a large inpatient setting to more of a predominantly outpatient setting. Four or five years ago, a patient was admitted to the hospital for 3 to 5 days for a procedure that is now done on an



Courtesy HMCN Mike Stewart

**HMCN Stewart extends holiday greetings to the enlisted staff of Fleet Hospital 5 in Zagreb, Croatia.**

outpatient setting—same day surgery, if you will. We have been training our corpsmen to an inpatient setting for years. And it's time to rethink that. More and more of our corpsmen will be going to branch clinics and operational units instead of only hospital environments right out of "A" school. We very much want to have more of an integrated health care system and bring medicine to the deck plates. We believe our great enlisted force can provide quality health care.

**What are some of the other issues you spend a lot of your time on?**

We're spending a lot of time creating a new NEC for the dental technicians. In my opinion, the dental technicians are incredibly motivated and professional. They can do a lot more than we have historically allowed them to do. We are working on two major initiatives right now. One is expanded dental care to allow our techs to do more things. We don't have as many dental officers as we need. It's imperative that we allow these well trained dental technicians to take up the slack.

We also need dental hygiene technicians. We cannot hire enough civilian dental hygienists to do cleanings, root scaling, etc. Who better to train to do these things than our dental technicians? It's upward mobility. It's an opportunity for them to get some advanced training and to meet our real requirements. We ought to be able to provide cleanings for our deployed sailors on ships, with the Marines, and overseas. Those are really tough places to contract civilian hygienists. This initiative is long overdue. We have started a pilot program this year and will expand it greatly next year. It is a radically different way of training which is called a work/study program. A stu-

dent goes to a civilian college and works in a Navy dental facility. They will also earn an AA degree.

**I know a lot of your time is consumed by travel. What are you looking for when you go out?**

A lot of the decisions we make here have a direct impact on where people work and how they do their jobs. It's critical that I go and see the nearly 32,000 enlisted folks I represent. I can't do that sitting here. It's important to learn what kind of conditions they are working under, what kind of constraints they are up against, whether that be afloat, with the Marines, or in medical and dental facilities scattered around the world. What kind of barracks do they have to live in? What kind of challenges are their families up against? What are their educational opportunities? What's the morale like within their commands? When we come back here to BUMED and make decisions about NEC changes, training, about anything, I have a point of reference. How are these decisions going to affect Cherry Point, Naples, or the First Marine Division when it deploys. I have to talk to people and try to walk in the shoes they're walking in to be able to do this job the right way.

**With your position here at BUMED you are the leading advocate for the Hospital Corps. Do you feel you are effective in getting a barracks cleaned up or a situation modified to the advantage of the enlisted community?**

Yes, and this is due to my great staff and the Surgeon General. He listens. He understands that the success or failure of Navy medicine rests on the shoulders of the enlisted personnel. He entrusted me with a lot when I took this job and he is very quick to implement those suggestions.

I think it's an extremely harmonious relationship. When I visit the field and observe problems or successes, the SG is interested. If he weren't, I'd say this job was ineffective. And it's also effective because of my relationship with the Master Chief Petty Officer of the Navy. What a tremendous advocate he is for enlisted people and the enlisted men and women assigned to Navy medicine. He is also very quick to help.

**I know you have been an advocate for physical training. Would you care to comment on that?**

Because of who we are, we must not only comply with but actively promote the CNO's physical readiness program. Whether you're a hospital corpsman or a dental technician, we are tasked to be the trendsetters for wellness. And if we're not well and taking care of ourselves and setting the standards for height, weight, and body fat percentage, how can we ask the rest of the Navy to follow our advice. We have to be in better shape than anyone. Our leaders need to look at the enlisted personnel assigned to Navy medicine and say, "This is the Navy's cream of the crop." We're getting there. I'm very proud of the enlisted side of Navy medicine. We are unlike any other rating in the Navy. Anywhere in the world you find the Navy or Marine Corps you will find enlisted Navy medicine. Ships don't get under way without their Navy medicine assets aboard, whether that's an independent duty corpsman or a full-blown medical department. No other rating in the Navy has the history, heritage, or tradition of the Hospital Corps. The Medals of Honor, the ships named after us testify to that. We must maintain our standards and strive to improve. We owe it to all those sailors who have gone before us and those now on active duty.—JKH



# The Benefits of Medical Prepositioning

LTJG Y.H. Aboul-Enein, MSC, USN

The term, "Prepositioning," was the hallmark of deterrence in the face of the Iraqi military buildup on the border of Kuwait last year. The Pentagon has prepositioned military hardware in warehouses in Kuwait, Saudi Arabia, and the United Arab Emirates. It is a tactic that makes sense for the region which requires a rapid deployment of forces and hardware to reinforce ground forces already in the area. With the success of this tactic, are we overlooking the planning for casualties in the region? Are we fully exploring the possibilities of medical prepositioning?

In the Navy, we talk of echelons of care in which a hospital corpsman provides basic first aid and life support. The corpsman then refers those with severe trauma to the battalion aid station where doctors stabilize the patient. If that wounded soldier requires further care, he or she is taken to the company and clearing areas where they are evaluated and stabilized. If needed, the wounded can then be evacuated to ships afloat, a field hospital, or to our medical facilities in Europe.

Taking our lead from the line community, we can preposition medical supplies and pharmaceuticals with a long shelf life along with the Bradley vehicles, M-16s, and Patriot missiles. Entire field hospitals may be stored and prepositioned for quick deployment in the desert. With prepositioning, we can attempt to package as much of this first echelon of care as possible. The package would be based on casualty estimates per battalion or brigade, nonperishable medical supplies, and pharmaceutical shelf life to name a few factors in the equation.

For the Army, Navy, and Air Force Medical Corps, our mission is the same—to conserve and sustain the fighting force. With that in mind, it is also possible to preposition as much of the second echelon of care in the Arabian

theater of operation. Through dialogue and mutual agreement with our Gulf counterparts and the ministries of health of our respective allies in the Gulf, we can provide state-of-the-art hospitals for our military specialists to practice their skills and save lives. It's like a prearranged, military health maintenance organization.

As a scenario, a Marine corporal is severely injured in the field. The corpsman evaluates and refers him to a company and clearing area where he is stabilized and medically evacuated to an urban hospital in Riyadh, Dhahran, Manama, or Dubai. Let's say the corporal is air evacuated to Riyadh, the Saudi capital. In Riyadh, our Navy-Army-Air Force team of specialists would be poised to receive the casualty at King Faisal Specialist Hospital, a tertiary care center, the Armed Forces Hospital, or King Fahd Medical City to name a few of the acute care centers in the Saudi capital.

There are many benefits to this modus operandi. Our doctors would have state-of-the-art medical facilities and ancillary support at their disposal. Moreover, medical prepositioning can provide intensive specialized care in a timely fashion and as close to the front as possible. This would alleviate pressure on hospital ships and field hospitals in the area. Finally, it would align ourselves with the line community's emphasis on prepositioning combat materiel in the Middle East.

The prearranged echelons of care can only be possible if there is mutual agreement and planning before a conflict arises. This would require the cooperation of the ruling families, the ministries of defense and health of our Gulf allies, and the Medical Corps of the three services. □

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# Change!

CAPT David G. Kemp, MC, USN

A majority of American physicians are nervous, frustrated, and often angry about change. Navy physicians seem less concerned, but in my opinion, we Navy medical officers are not concerned enough. Frequently, I hear Navy physicians talk confidently that our military unique role will protect us from changes imminent with health system reform. Whether our nation's health system is reformed by government or market forces seems immaterial; change is inevitable, and, coupled to massive military downsizing, Navy medicine will enjoy no immunity.

I believe the basic elements of change are reasonably clear at this time: the "bottom line" goal is to achieve greater value for every health care dollar expended. The more oft quoted and altruistic goal of universal access will continue to be held hostage to political realities and remain secondary until the cost of health care is brought under control. For DOD health care, value will be sought by increasing emphasis on primary (especially outpatient) care, consolidating or contracting inpatient services at inefficient facilities, and instituting business practices which will maximize provider efficiency and reduce variation. Sophisticated information management systems are now being developed to make it possible for leaders and managers to rely on objective data rather than continuing to rely primarily on the "wise counsel" of specialty advisors, senior officers, and trusted associates.

The Navy Medical Corps' greatest strength is that we practice medicine of extremely high technical quality. The Navy Medical Department, however, is burdened by a mission under Title 10, U.S. Code which remains vague and often misunderstood by both staff and patients. Offering health care "as available," is not part of the new paradigm of health system reform! Constrained by federal regulations, we often lack the ability to respond effectively to needed change by adjusting staffing ratios, buying new equipment, replacing antiquated facilities, et cetera in a timely manner. While there is a great deal going on at both the BUMED and ASD-HA levels to lead change, no high level administrative change can generate real value until it somehow positively alters the manner in which a physician (or other provider) actually provides care for their patient.



How well is the Navy Medical Corps positioned to adapt to the new health system paradigm? Our present Medical Corps culture strongly encourages subspecialization above the primary care specialties, justifies physician-oriented vice patient-oriented practice patterns, and often fails to comprehend the realities of competition which we may soon face head on.

Consider this "unthinkable" scenario: USNS *Comfort* and USNS *Mercy*, noncombatant ships, now deploy manned by a civilian crew. Could these ships not also deploy with a contracted medical staff composed of highly qualified specialists, derived from a consortium of medical schools, and contractually attracted by financial retainers as federal subsidies for graduate medical education dry up?

Navy physicians need to wake up and take leadership roles in directing the course by which change will be achieved. A lot can be accomplished at the "deckplate" (clinic and inpatient ward) level by our most junior physicians if they understand why change is needed, and are unwilling to wait for BUMED to make "the big fix" for them.

Paul Starr's Pulitzer Prize winning book, *The Social Transformation of American Medicine*, details a history of how medicine has been practiced in America since revolutionary times and is a great help in understanding the social, economic, and professional forces that have shaped our profession's past and will determine our profession's future. Starr contends that we are in the "industrialization" phase of health care delivery, and I believe he is right. If this is indeed the case, we Navy physicians must be willing to place autonomy of the profession above individual autonomy, acting in concert and emphasizing the ancient fiduciary relationship between patient and physician if we are to remain a greater force than highly paid employees.

Change is almost always perceived with apprehension and in a negative light. Yet, when I reflect upon the changes which have occurred during my 25 years in the Navy, I realize that we have changed a great deal, both in our standards of practice and in the way the Medical Corps views itself. But the history of Navy medicine over the past 25 years reveals that most significant changes were resisted, especially by careerists, and came only when external forces exerted a significant level of control on our clinical operations. This time, we as physicians should take the lead, get out in front of change, and set a course which will develop a Navy medical health system that goes beyond technical quality to include reliable access, efficient use of resources, a renewed focus on the patient, and a willingness to risk innovation. □

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When this article was written Dr. Kemp was the Surgeon General's Specialty Advisor for Internal Medicine.

# Shuttle Space Launch of Navy Bone Marrow Cell Growth System

During a spectacular night launch from the Kennedy Space Center in February 1995, Navy scientists from the Naval Medical Research Institute (NMRI), Bethesda, MD, deployed into earth orbit bone marrow stem cell growth experiments. These first experiments, on board the space shuttle *Discovery*, show promising initial results that can lead to healthier and more productive astronauts. These results can also lead to lifesaving techniques on the battlefield for casualties of acute bone marrow injury. A second set of experiments went aboard space shuttle *Endeavor* on 7 Sept 1995.

The goal of the space shuttle studies is to examine how microgravity affects hematopoiesis, the generation of the cellular components of the blood, which occurs within the intricate microenvironment of the bone marrow. Bone marrow stem cells give rise to all the mature elements in the blood such as red blood cells, neutrophils, monocytes, lymphocytes, and platelets.

In a cooperative research effort between NMRI's Immune Cell Biology Program and Celco, Inc., Germantown, MD, a civilian biomedical research company, scientists developed a unique *in vitro* hematopoietic culture system that mimics the microenvironment of the bone marrow. This unique culture system is incorporated in a self-contained artificial capillary system, coated with a layer of endothelial cells, that supports large scale growth of stem cells. The system makes stem cell growth very simple, rapid, and cost-effective.

Dr. Thomas A. Davis, lead scientist on the shuttle project and associate chief of the Stem Cell Biology Branch, NMRI, said, "NASA became aware of the bone marrow research being done at NMRI and invited us to deploy the bone marrow culture system to investigate space anemia."

Kelvin P. Lee, MD, head of the Stem Cell Biology Branch, NMRI, pointed out, "It has been shown that astronauts exposed to microgravity develop persistent hematological abnormalities. For example, they become anemic and their lymphocytes don't function normally. The causes are presently unclear, and it is important to know for future missions like the Space Station. If there is even a Mars mission with astronauts in microgravity conditions for 18 months or more, researchers will need to predict what will happen. Little is known about what actually happens on a cellular basis in the bone marrow at zero gravity. These experiments are the first attempts to look at that." On the first mission, NMRI scientists deployed three sets of human bone marrow cell cultures in low earth orbit. The effects of microgravity on the growth and development of these cells is being examined and compared to identical ground-based controls.

"The February 1995 experiments were an unqualified success," Dr. Lee noted, "Things couldn't have gone much better. We received very positive feedback from the other groups flying experiments on the mission, including scientists from Harvard, NIH, NASA, and the Army, regarding the high quality of Navy biomedical research."



Dr. Davis went on to explain, "The first experiments were a great success on several counts. First, they demonstrated that NMRI's hematopoietic culture system can be deployed and function under extreme conditions utilizing established technology. Second, the project yielded exciting experimental data demonstrating that prolonged exposure to space flight environmental conditions have a direct effect on bone marrow hematopoietic stem cell growth and red blood cell development. Third, these studies indicate, for the first time, that hematological abnormalities such as space flight anemia suffered by astronauts may arise from abnormal red blood cell production, cell function or regulation within the bone marrow microenvironment after prolonged space flight. Furthermore, these findings suggest that gravity may play a direct role in complex biological processes."

According to Dr. Davis, "NASA was excited with the initial data from the first experiments and invited us back to do a second launch as soon as possible. The second experiment is an exact repeat of the initial study. The second shuttle experiment will demonstrate the reproducibility and deployability of the culture system."

The space shuttle efforts are a Navy/Army collaboration. NMRI scientists focused on the medical science of the culture system. The NMRI culture system was used in conjunction with the Army cell culture unit (The Space Tissue Loss Model-A [STL-A]). The STL-A, a self-contained cell culture apparatus, was developed at the Walter Reed Army Institute of Research (WRAIR), Department of Space Biosciences, to be placed in a middeck payload lock on the space shuttle.

Dr. Davis said, "We have established a tremendous Navy/Army working relationship with the Department of Space Biosciences at WRAIR. This team of scientists is on the forefront of biomedical engineering for the battlefield and this collaboration will undoubtedly lead to new products for military medicine."

Dr. Davis said, "The culture system holds great promise for the future, but now is in its infancy and currently undergoing qualification for clinical use.

This is a lengthy process that will take many years to accomplish." Dr. Davis pointed out, "The mission provided an opportunity for us to demonstrate to the Navy the deployability of the culture system. What is more far forward than space."

The bone marrow stem cell research is part of the Combat Casualty Care Program of the Naval Medical Research and Development Command (NMRDC), Bethesda, MD. Research scientists are focusing on culturing bone marrow stem cells outside the body for the treatment of casualties caused by acute bone marrow injury.

Acute bone marrow injury can be caused by battlefield weapons (chemical, biological, and radiation weapons), accidental exposure (ionizing radiation from nuclear reactors), or from other injuries (overwhelming sepsis). Development of this bone marrow culture system may result in a forward deployable treatment that is technically simple and no more demanding than a blood transfusion.

NMRI is one of eight laboratories and three detachments that make up NMRDC. The mission of NMRDC is to provide timely solutions to Navy and Marine Corps medical and operational problems through biomedical research, development, test, and evaluation. NMRDC scientists conduct basic, clinical, and field research directly related to military requirements and operational needs. Research is also supported in other Navy laboratories as well as in partnership with the Army and Air Force and with other federal agencies. Research in nongovernment laboratories is promoted through an active collaborative research and technology transfer program that develops cooperative research and development agreements with universities and private industry.

Navy-supported medical research efforts have influenced the civilian practice of medicine, assisted the Ministries of Health in developing nations, and provided technology for other federal initiatives.

For more information contact CAPT T.J. Singer, MSC, at 301-295-6182.

—Story by Doris M. Ryan, Deputy Director, External Relations for Naval Medical Research and Development Command, Bethesda, MD.

# Psychology on the High Seas:

## USNS *Comfort*'s Mission to Uphold Democracy

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*We learned from Delta that an SOB—Shrink On Board—was a good idea.*—CDR Richard Marcinko(1)

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LCDR Bryce E. Lefever, MSC, USN

USNS *Comfort* (T-AH 20) was deployed in support of Operation Uphold Democracy and was stationed off the coast of Port-au-Prince, Haiti, for 3 weeks. The original mission was to provide medical/surgical support for combat casualties resulting from the invasion of joint forces. When diplomacy succeeded, our mission became less dramatic, but no less important. We were to treat U.S. and allied armed services personnel. Humanitarian care was also to be provided to medical personnel, and Haitian nationals injured as a result of military clashes. As a fully operational floating hospital, *Comfort* was represented by a full complement of special-

ties including surgery of all varieties, internal medicine, pediatrics, obstetrics/gynecology, psychiatry, clinical psychology, otolaryngology, nursing, dietary services, physical therapy, dentistry, occupational health, and patient administration. As our mission became one of wider scope, we prepared for everything and were prepared for anything.

### **Mental Health Aboard *Comfort***

The mental health division consisted of a psychiatrist, a clinical psychologist, and five psychiatric technicians. (Shortly after getting under way, three of the psych techs



were permanently reassigned to the flight deck crew.) The psychiatrist, who had medical specialties in occupational and emergency medicine, was assigned as head of the Casualty Receiving Area (CASREC) which left the psychologist (myself) functionally in charge of mental health.

### Psychology Aboard *Comfort*

Psychology aboard *Comfort* was challenging and rewarding. Navy psychologists have been assigned for shipboard duty only rarely (Dr. Kleiger on *Comfort* and Dr. Laszlo Navradsky on *Mercy* during Desert Storm). The primary mission is surgical support. The challenge was to create a mental health division from scratch, with no preexisting materials and without the benefit of either psychiatrist who had been deployed on the previous cruise. It should be noted we offered mental health services during previous deployment for Operation Sea Signal. Here is what we did:

Right off the bat, while we were under way to the Caribbean, we set up stress management groups. Further into the cruise, we provided smoking cessation programs and offered a variety of educational opportunities through Staff Education and Training.

We provided routine *outpatient* evaluations for the ship's crew as referred from sick call. Problems included stress, alcohol abuse, marital problems, and spouse and child abuse.

Once we arrived in Port-au-Prince, our mission was to serve U.S. and allied military personnel in theater requiring emergent care. Medevaced to the ship were a variety of "psychiatric casualties" including two who presented as suicidal; another who presented as homicidal; one who was experiencing a manic episode (and who was psychotic); another who had completed a suicide; a member of the media who was psychologically traumatized because he had witnessed a Haitian man being clubbed, stoned, and hacked to death with machetes (and who was nearly killed when he attempted to intervene); and a variety of patients who presented with cardiac symptoms (but for whom no organic problems could ultimately be found). Several of these patients were hospitalized. The practice of *inpatient psychology* on board *Comfort* was virtually identical to its land-based counterparts, replete with long hours, frequent patient contacts, team approach with nursing and corps staff, preponderant paperwork, and administrative obstacles (working our medevacs, etc.).

Normally, the practice of clinical psychology includes the use of *psychological testing*. However, psychological

tests were not used aboard *Comfort* and may not be necessary (or advised) in the "brass tacks" treatment of psychiatric casualties.

### Treating Psychological Trauma

There are two categories of psychological trauma. First, there is the direct experience of a life-threatening event such as that experienced by soldiers in battle. The exposure to such events typically produces a stress reaction which can take the form of a shutdown of functioning or withdrawal (usually indicated by the "thousand mile stare"), pressured speech or incessant retelling of the trauma, loss of appetite, inability to sleep and increased vigilance, anxiety attacks, personal vulnerability, psychological numbing, and/or avoidance of stimuli associated to the trauma.

The second kind of trauma occurs in emergency workers (medical, fire, police) who have to deal with the cleanup of a traumatic event and the treatment of its victims. The cleanup of trauma casualties (wounded and dead) is, in itself, a source of significant trauma. The reactions or symptoms resulting from both forms of trauma are identical.

The treatment for both kinds of trauma is called Critical Incident Stress Debriefing(2) and is widely used by civilian emergency medical associations who provide teams who are dispatched when the care and cleanup of trauma victims becomes overwhelming. The Navy has several of these teams (located at Naval Hospitals San Diego, CA; Bethesda, MD; and Portsmouth, VA) called "SPRINT" for "Special Psychiatric Rapid Intervention Team." The Critical Incident Stress Debriefing model was used on several occasions on *Comfort*.

Critical Incident Stress Debriefing was requested for a group of junior corpsmen who had to clean up the body of a soldier who died by self-inflicted gunshot to the head. These corpsmen had cleaned the body, wrapped the head, and placed the body in a body bag. Two hours later, they had to repeat the whole process for investigative purposes. A debriefing (actually, a "defusing" which is a briefer and earlier intervention) was provided for this group of corpsmen and focused on how well they had performed their jobs under stress, and how well they had functioned in general. No psychiatric followup was required for this group.

The second occasion was the most traumatic event of the cruise. A beloved crewmember, a 29-year-old father of three, was tragically killed in a jet ski accident while on liberty. Needless to say, the crew was shaken. Critical Incident Stress Debriefing groups were arranged and

individual counseling was offered. It is felt that because of the early and direct intervention, as well as a dignified memorial service 2 days later, no psychiatric followup was required.

An individualized Critical Incident Intervention was provided for a member of the media who was nearly killed and considerably traumatized. This was provided the morning after his trauma and was so successful that he was smiling and was able to ride the helicopter back to Port-au-Prince (and back to work) at 1230.

### Combat Casualty Model

Combat casualties historically comprise 10 percent of all casualties. During World War II some units suffered psychiatric casualty rates higher than 50 percent. The psychologist or psychiatrist should be prepared to implement the Critical Incident Stress Debriefing model (or similar rapid interventions) for individual and group casualties within the operational theater. When treating traumatized, highly anxious, stressed out, exhausted, and less than optimally functioning individuals follow these guidelines:

**Immediacy:** Treat the casualty as soon as possible taking into account the need for some food and rest; “three hots and a cot.”

**Proximity:** Treat the psychiatric casualty as close to the front (and his unit) as possible.

**Normalcy:** Do not treat the psychiatric casualty as a psychiatric patient (or really a patient at all), but deal with his immediate concern or trauma.

**Familiarity:** Return the servicemember to his *original* unit (as soon as possible).

Clearly, soldiers in Haiti were under stressful conditions, and faced the threat of harm or death. Some were exposed to combat situations, to search and seizure operations, and to riot/crowd control. It is not surprising then that a significant number of patients medevaced to *Comfort* were psychiatric casualties and exceeded 10 percent of all medevacs.

### Problem of Anxiety Attacks in Emergency Medicine

At least three of the patients medevaced to *Comfort* for “cardiac” problems appeared to be suffering panic attacks. A few hints were dropped to suggest this, and the trauma team (as well as the admitting doctors) ignored these hints and worked up these patients for evidence of organic disease. Even when no organic problems were found, it was “explained” that the shortness of breath experienced by one patient was some sort of bronchial

spasm requiring bronchial dilation (breathing treatments). Ultimately, one internist consulted me on a rather fit-looking soldier who had no organic findings, and who indeed had clearly suffered a number of incapacitating panic attacks.

Two points need to be made. First, as soon as a “cardiac” patient shows no evidence of a cardiac event (especially if he is still obviously suffering), a psychologist or psychiatrist should be consulted for that likelihood that he/she is experiencing panic.

Second, an individual suffering a panic attack typically has significant breathing problems—either he/she breathes too rapidly (hyperventilation) or he/she continues to breathe in without adequately breathing out and feels like he/she is smothering (dyspnea). This smothering sensation is terrifying and looks like bronchial spasms (and can be quickly and effectively treated through breathing exercises and other on the spot interventions).

### Final Recommendations

There is very little that a psychologist needs in terms of preparation for shipboard deployment. The Navy psychologist is exceptionally well trained by the four-rotation internship which includes 3-month rotations in health psychology, outpatient psychology, inpatient psychology, and psychological assessment. As indicated above, the psychologist will probably need all (or at least three) of these skills on such a mission. The next most critical training is to obtain basic and advanced Critical Incident Stress Debriefing training as provided by its developer, Dr. Jeff Mitchell. Next, the psychologist should have some operational exposure and/or experience working directly with the line. Lastly, the psychologist will need a working knowledge of the model for the treatment of combat psychiatric casualties.

The challenge, teamwork, and team spirit providing support to the deployed troops is an adventure; I heartily recommend the entire experience. As the *Rogue Warrior* stated, having an SOB (Shrink On Board) is a good idea. I can unequivocally state that being an SOB is also a good idea.

### References

1. Marcinko R. *Rogue Warrior*. New York, NY: Pocket Books; 1992:11.
2. Mitchell J, Everly G. *Critical Incident Stress Debriefing: CISM*. Ellicott City, MD: Chevron Publishing Corp; 1993. □

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# Changing Procedure for Blood Culture Drawing Prevented Injury and Contamination

LCDR Kathryn L. Martinson, NC, USN

In 1992 the Infection Control Committee (ICC) at Naval Hospital Orlando, FL, looked at the data on sharp injuries of the past 2 years (January 1990 to December 1991) that resulted in a blood exposure incident. The purpose was to identify areas of sharps usage where process improvement could be used to eliminate or reduce staff blood exposure incidents. It was noted that one process—drawing blood cultures—had resulted in 3-4 percent of the blood exposure incidents over the past 2 years. The data indicated the sharp injuries incurred were directly related to changing the needle used for venipuncture to a sterile needle before inoculating the culture bottles.

Changing needles before inoculating the culture bottles has traditionally been a part of the nursing procedure for drawing blood cultures<sup>(1)</sup> as a means to reduce the incidence of contamination by skin flora. Three recent studies<sup>(2,3,4)</sup> reported in the literature indicated the practice of changing needles may not be necessary. The ICC decided to change the hospital's policy on drawing blood cultures, eliminating the practice of changing needles and putting more emphasis on the skin preparation as the means of eliminating contamination by skin flora. Prior to changing the policy, the average contamination rate was 4 percent for the previous 2 years. Although 4 percent is an acceptable contamination rate<sup>(5)</sup> the ICC decided it would like to see a lower contamination rate and set a goal of 3 percent. For each blood culture the lab does not have to work up as a skin contaminant, there is considerable savings both in time and money.

A new hospital policy for drawing blood cultures was written, eliminating the changing of needles after drawing blood. It clearly states that the skin should be prepped with 70 percent alcohol followed by povidone iodine or iodophor prep which must be allowed to dry for 2 minutes prior to venipuncture and that the skin should not be touched after being prepped.<sup>(6)</sup> Nursing took the responsibility for training staff on the correct way to disinfect the skin and draw the blood cultures by including the drawing of blood cultures as a competency skill in the various nursing units' orientation programs.

The new procedure was implemented in March 1992. The ICC continued to monitor the blood contamination rate, reporting number of contaminated cultures to the nursing units responsible. The contamination rate from March 1992 to

December 1994 was 2.42 percent. The average contamination rate for the 6 months prior to implementation was 4.78 percent. The average contamination rate for the year following implementation of the new procedure was 1.00 percent. The decrease in contamination rate seen after the implementation of the new procedure for drawing blood was believed to be due to the procedure being simpler, the emphasis on the skin preparation, and that all staff responsible for drawing blood cultures were trained in the new procedure.

Beginning in September 1993 we noticed a significant increase in our contamination rate. The average contamination rate for the 6 months from September 1993 to February 1994 was 6.19 percent. It was believed that this increase was due to an influx of new staff, particularly junior enlisted personnel who did not receive adequate training in drawing blood cultures during their orientation. In February 1994 staff on the units were retrained in the procedure. The contamination rate dropped shortly after completion of the training to 1.74 percent for the period from March 1994 to August 1994.

After implementing the new procedure in March 1992 we have had 0 percent blood exposure incidents involving blood culture collection. Drawing blood cultures without switching needles made blood culture collection safer and more efficient at Naval Hospital Orlando. Eliminating changing needles with emphasis on the skin preparation and staff training reduced our contamination rate and the cost of processing blood cultures.

## References

1. *Navy Nursing Procedure Manual*, NAVMED P-5066-A, 1 Jan 1985.
2. Krumholz H, Cummings S, York M. Blood culture phlebotomy: switching needles does not prevent contamination. *Ann Intern Med.* 1990;113:290-292.
3. Chapnick E, et. al. Technique for drawing blood cultures: Is changing needles truly necessary. *South Med J.* 1991;84:1197-1198.
4. Leisure, Moore, Schwartzman, Hayden, Donowitz. Changing the needle when inoculating blood cultures. *JAMA.* October 24/31 1990; 264:2111-2112.
5. Aronson M, Bor D. Blood cultures. *Ann Intern Med.* 1987;106:246-253.
6. Procedure for blood culture drawing. *Standards and Practice Manual.* Naval Hospital Orlando, 15 Aug 1994. □

When this article was written, LCDR Martinson was assigned to Naval Hospital Orlando, FL.

# Maximizing Medical Readiness:

## An Organizing Framework for the MHSS at the Millennium

CDR Diane M. LeDonne, NC, USN  
CAPT Mary S. Savitsky, NC, USN

*In the May-June 1995 issue of Navy Medicine the authors described how the Plans, Analysis and Evaluation staff at the Bureau of Medicine and Surgery took a systems approach to link the development, implementation, and evaluation of Navy medicine's corporate strategy and designed a model which depicts process which maximizes the readiness mission. In this article, they suggest that the model can be a useful organizing framework for the entire Military Health Services System (MHSS) during this period of rapid and exponential change.*

### Why We Need a Model for the Millennium

Uniformed health care professionals and technicians exist to provide health care support to the fighting

forces. Accordingly, the activities of military health care ought to consist of those which result in the readiness of the operational forces. If successful, it means the sailors, airmen, soldiers, and marines will be healthy, i.e., physically and psychologically able to perform their day-to-day operational mission and fight during war. As recently stated by the new Navy Surgeon General, VADM Harold M. Koenig, MC, "But how do you measure readiness? The easiest way I know is to ask ourselves a simple question: Are we keeping the people of the Navy and Marine Corps on their job?"(1) In addition, military health care is expected to engage in activities which will assure the "readiness" of medical personnel. This means the Military Health Services System (MHSS) will be capable of

providing the health care support required by the operational forces during both peace and war.

The MHSS is increasingly under intense scrutiny as dollars get fewer and questions are raised about current and future programs. Internal and external groups seek solutions to problems identified and acknowledged by the three Surgeons General. For example, one of many recent analyses, this one by the Congressional Budget Office,(2) specifically addresses concerns about future readiness of the MHSS, i.e., its ability to provide the required support.

We are living in a period of exponential and rapid change.(3,4,5) Some of the internal and external events and actions which are affecting the future activities and functioning of the MHSS are depicted in Figure 1. These in-



clude the continued effects of the Base Realignment and Closure Commission (BRACC), downsizing and consolidation, fiscal constraints, TRICARE, Department of Defense Commission on Roles and Missions of the Armed Forces, increased shift to joint military and federal activities, military medical regionalization and Lead Agents, and the changing priorities of Americans.

Health care is also changing.(6) The focus is shifting to ambulatory, primary, and preventive care; there continues to be rapid proliferation of advanced technologies; the information age is no longer theoretical as

evidenced, for example, by the proliferation of telemedicine; and the negative consequences of managed care are beginning to be identified.(7)

A systems model is needed to provide focus, illustrate the process of interaction and interrelationships among the various components, and define the purpose for all actions and activities. No such model currently exists.

### How Corporate Strategy is Developed

Organizations develop strategy to achieve their objectives and in response to perceived threats and op-

portunities in their environment. Strategies help them cope with change and achieve their purposes. Once formulated the strategies can change the structure and functioning of the organization, as well as the behavior of people who make it function. Strategy development is a highly complex and continuous process which, to be effective in today's environment, integrates several of the concepts recently described by Henry Mintzberg(8) and Peter Senge.(9)

Mintzberg says leaders must change their focus to thinking and acting strategically, instead of spending time and energy constructing an

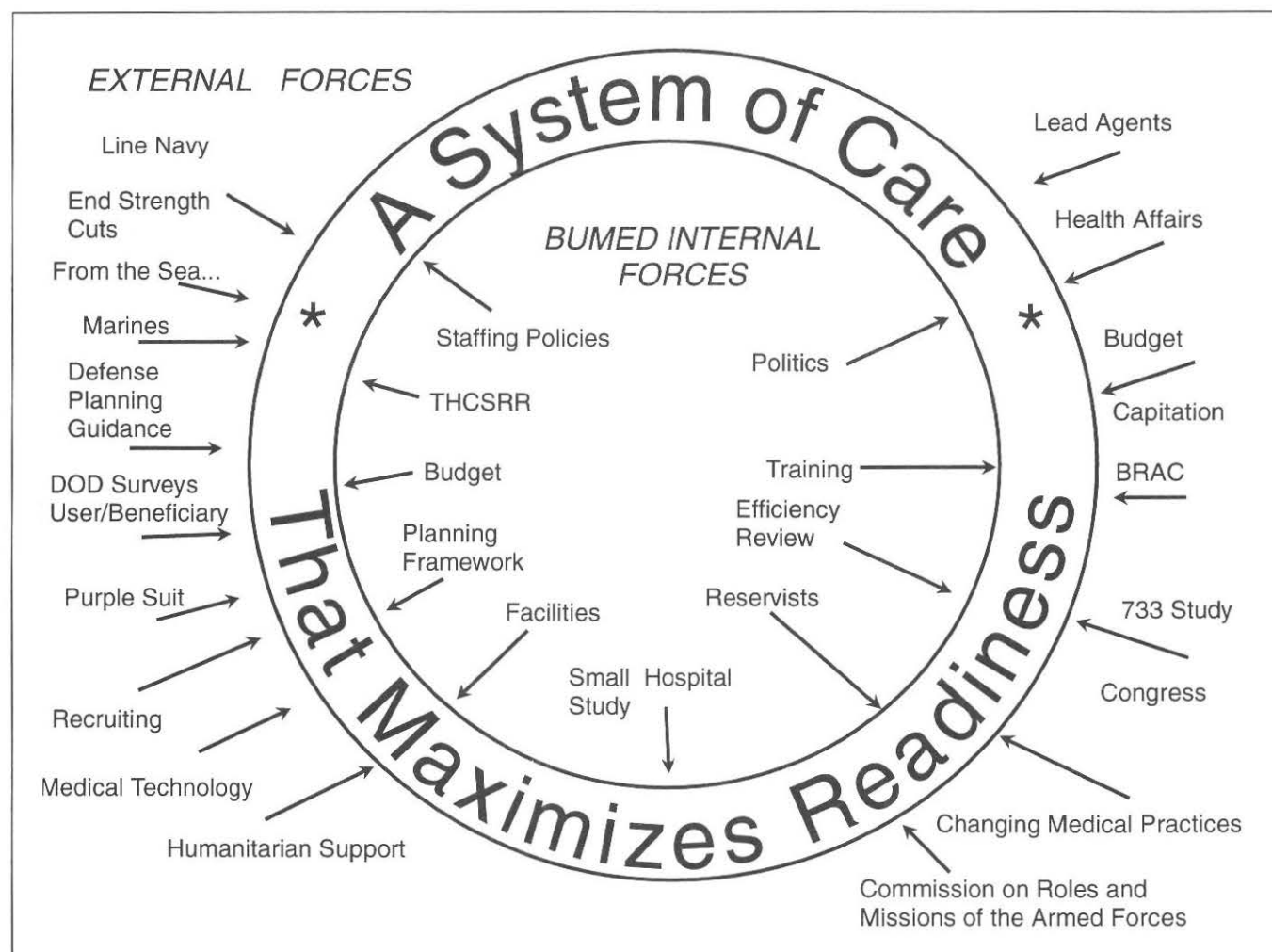


Figure 2

# *The Dynamic Process by Which Navy Medicine Maximizes it's Readiness Mission*

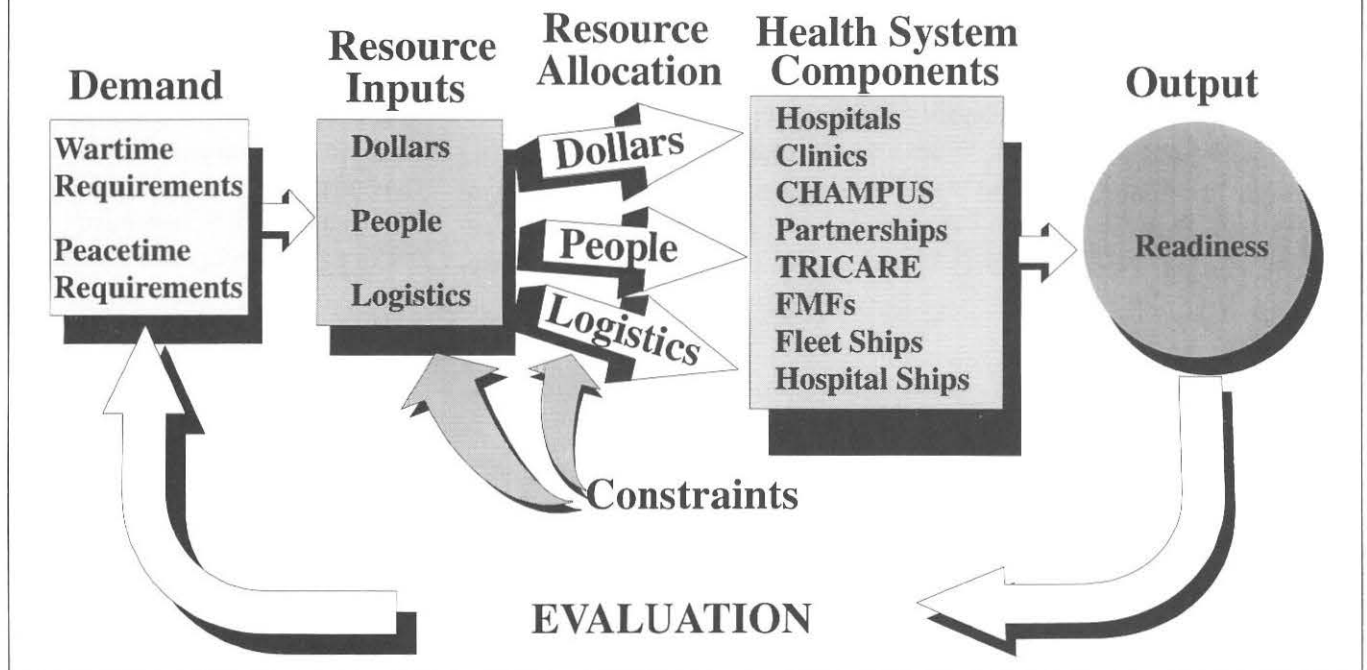


Figure 2

elaborate written "strategic plan." Strategic thinking is about synthesis, that is, combining all the pieces together into a whole.

Successful synthesis results when there is an integrated perspective of the enterprise, which all can understand. Similarly, Senge speaks of "systems thinking" as a framework for understanding interrelationships when there is complexity. He notes that we have to shift from seeing "parts" to seeing "wholes." Accordingly, the corporate leadership must continuously design strategies which are proactive and which maximize the opportunities, while minimizing the threats.

Senge also describes the concept of "shared vision," which occurs when the leadership believes in the true "power" of an organization, i.e., the ability to be effective in achieving goals lies within individuals at all levels. A shared vision is essential to ensure achievement. When individuals share the vision, he states, they do more than blindly accept it—they incorporate it into their behavior.

First, however, there must be a model which illustrates the process of how the overall system works, including all its components and how they interact. Only then will there be rational purpose for the strategy.

## **Systems Model for the MHSS Which Maximizes Readiness**

The office of the Assistant Chief, Bureau of Medicine and Surgery, for Plans, Analysis and Evaluation (PA&E) was created in 1993 by the Surgeon General. This multi-disciplinary group is empowered to engage in strategic planning, rigorous analysis, and evaluation of Navy medicine. As the "honest broker," they are expected to integrate diverse concepts and viewpoints, and coordinate activities of the multidisciplinary headquarters staff. Using Mintzberg's concept of "synthesis" and Senge's concept of "systems thinking," they used a systems approach to identify a



process to illustrate how Navy medicine can develop, implement, and evaluate corporate strategy.

However, it became clear early on to the PA&E staff the process they were designing had to encompass the entire MHSS, inasmuch as Navy medicine is becoming increasingly interdependent on the other federal services in a joint environment. Thus, it became crucial to find a way to organize the multiple and complex events and aspects of military health care and to depict the interrelationships.

The resultant process (Figure 2) is cybernetic, iterative, and dynamic. A cybernetic system is one that is self-regulating. "Iterative" means that each time the process occurs, the result more closely approximates the desired outcome. "Dynamic" means that many elements are continuously changing or evolving, so that the process itself is also continuously changing and evolving.

The process depicted in Figure 2 is a system of care that maximizes readiness. As a "system of care," multiple interdependent elements work together to achieve a common purpose, including all types of health care providers as well as the support people who enable them to work with patients, educators, facility and personnel managers, venues, comptrollers, logisticians, wartime planners, and policymakers.

"Readiness" is the desired dynamic outcome of the process. As defined by the Department of Defense,<sup>(10)</sup> readiness is the "ability to mobilize, deploy and sustain field medical services and support for any operation requiring military services; to maintain and project the continuum of health care resources required to provide for the health of the force; and to

operate in conjunction with beneficiary health care." The system of care depicted in Figure 2, if effective, will maximize readiness, that is, increase the readiness state to the highest possible attainable level, on a continuous (not a static, one-time) basis.

The components of the process include the categories of demand, resource inputs, resource allocation, health system components, output, and evaluation. The wartime and peacetime requirements constitute "demand" for clinical services (expected requirements for health promotion services, morbidity). Demand determines the resources required ("inputs" to the system) including dollars, people, materiel, and facilities. Resource allocation is dependent on the number and types of resources available. The structure, function, and components of the MHSS result from the resource allocation process.

The staff recognized that a parochial approach is no longer appropriate in a joint environment. Interdependent on other services, other federal, and the private sector, health care will increasingly be provided in the context of a multiaspected managed care type of system. The "system" is no longer confined to military treatment facilities and uniformed providers. The new MHSS includes other federal, TRICARE, PRIMUS clinics, and CHAMPUS venues and providers, and many others in the private sector not yet identified or developed.

Achievement of the desired outcome, readiness of the operational forces and of the MHSS, will be evaluated using measures of effectiveness (MOEs). These will assess the intermediate products of mission achievement, just as a monitor on the IV

pump help assess the effectiveness of the machine in delivering a solution. Each military health care region, and the MHSS as a whole, will have the capability to identify trade-offs required or actually made so that the achievement of readiness will be maximized.

## Conclusion

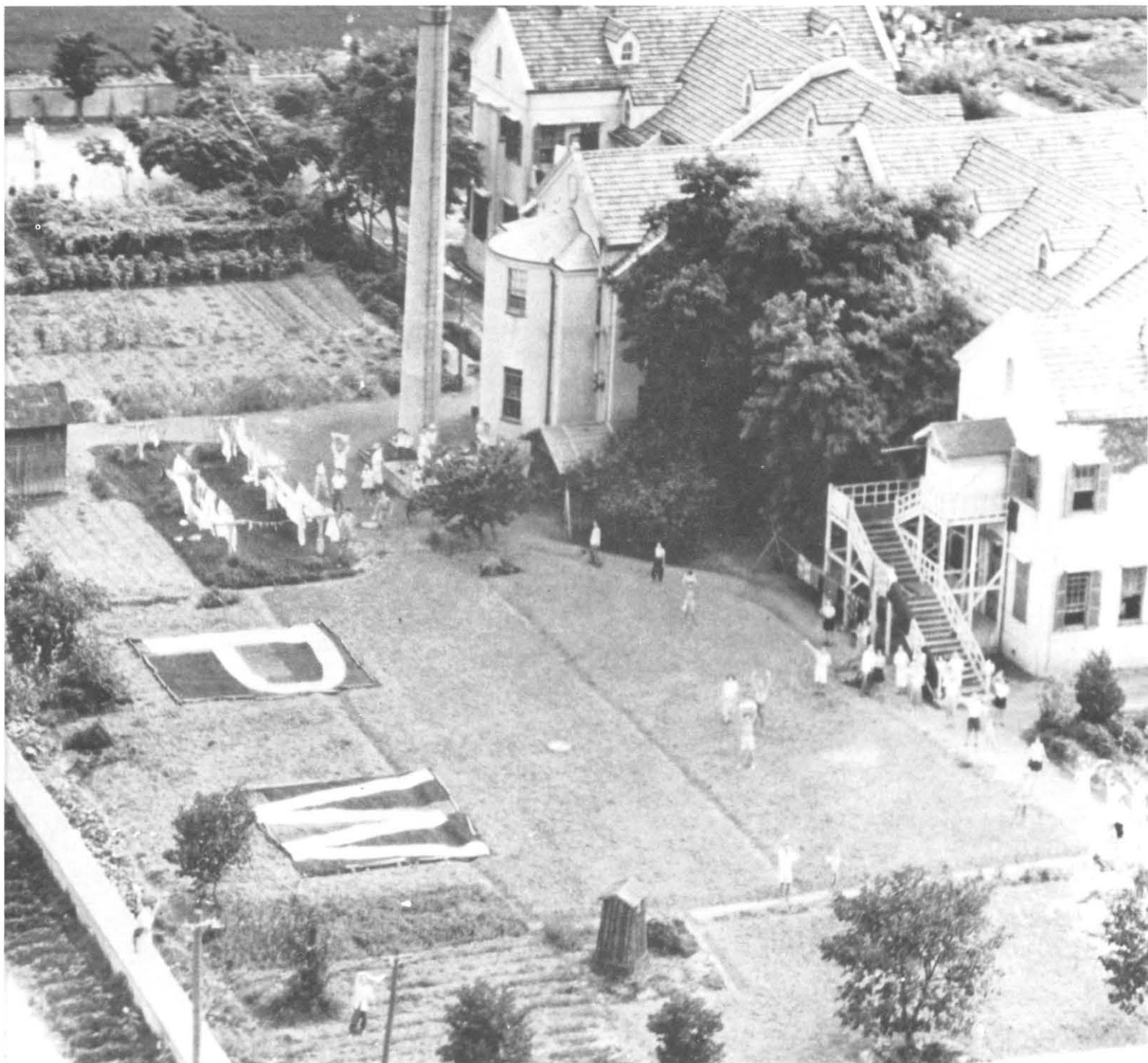
We believe the systems model developed by the PA&E staff is timely—given the nature of change—and relevant. It will provide a much-needed focus for military health care for the year 2000 and beyond, and a structure upon which the MHSS can base its strategy.

## References

1. Koenig HM. Opening remarks—All Corps Specialty Advisory Conference, Washington DC. 18 April 1995.
2. Singer NM. On the Wartime Mission of the Military Medical System. Statement before the Subcommittee on Military Personnel, Committee on National Security, U.S. House of Representatives. 30 March 1995.
3. Kennedy P. *Preparing for the Twenty-First Century*. Random House; 1993.
4. Peterson JL. *The Road to 2015*. Waite Group Press; 1994.
5. Rowley W. The Future Is Not What It Used to Be. Speech given at numerous Navy and triservice meetings during 1995.
6. Dysart N. The Transformation of Naval Medicine. Speech given at numerous Navy and triservice meetings during 1994.
7. Califano JA. *Radical Surgery*. Random House; 1994.
8. Mintzberg H. The Fall and Rise of Strategic Planning. *Harvard Business Rev*. Jan-Feb 1994.
9. Senge PM. *The Fifth Discipline*. Doubleday Publishers; 1990.
10. DOD. Medical Readiness Strategic Plan—2001; 1994. □

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At a camp on Honshu, allied POWs rejoice at seeing Navy planes fly over their camp to drop food and medical supplies. *Right:* Sick and emaciated POWs pose in a hospital coach on their way to the port city of Nagasaki.





# Ecstatic to be Free

**D**uring the long years of captivity for the prisoners of the Japanese, news from the outside was scarce. Early on, rumors often wafted through the camps that Germany was on the ropes and that the Axis' days were numbered. Could not then freedom be far behind? But the months turned into years. The Japanese withheld letters from home, and only with the arrival of new drafts of prisoners into camp did shreds of news reach the men regarding the American advance through the Pacific. The return of U.S. airpower to the Philippines and Japan itself in late 1944 and early 1945, was graphic evidence even to the prisoners that the war was going badly for Japan.

Yet for many POWs scattered throughout Japan and Manchuria, the end of the war came suddenly and without warning. Beatings and work details abruptly stopped. Guards became overly friendly and solicitous, offering food and favors. In some camps the Japanese told the inmates to paint "PW" on the roofs of prominent buildings.\* At Tsuruga camp in west central Honshu, where American strategic bombers had been hammering the industrial heartland

\*With the cessation of hostilities and even before the formal surrender documents were signed, allied instructions were very strict regarding relief for the POWs. Camps were to be marked to allow the supply of critically needed food and medicine from the air.

for months, B-29s returned. But this time from bomb bays, bundles not bombs now dropped slung beneath brightly colored parachutes. Men rushed headlong into rice paddies where the packages had landed and fell upon them with relish. Some containers broke open, spilling the contents in the mud. No one seemed to mind. There were steaks, candy, cigarettes, canned meat, sugar, newspapers, and medical supplies.

In what was left of Osaka, PhM2c Ernest Irvin and his buddies reveled in their new found freedom.

## De Wah is Now Ovah

About 6 days before the repatriation, forces came in to get us. They moved us to Osaka to a Japanese Red Cross hospital where we had beds, sheets, and three to a room. I guess they were putting on a show for the people coming to repatriate us.

The Americans started dropping barrels of food. Some would break loose from their parachutes and come crashing down, some on houses. There was fruit cocktail splashed all over the place. The liberation forces took a long time to get to us there in Osaka.

About 2 days after the surrender Dr. Ohashi [the prison doctor] called us out—that is those who could walk—and told us the war was over. He said: "De Wah is now ovah! There are three reasons. The Em-



Photos from BUMED Archives



Shipfitters from USS *Wichita* (CA-45) rig showers for POWs on the dock at Nagasaki.

peror has ordered everyone to cease fighting.” We chuckled at that. “The Americans have invented some kind of atomic bomb. And number three: We have no more Navy.” We roared when we heard that.

They stacked their rifles and we were then free to come and go as we pleased. Oh, we did have to log in and out, but no one used their own name. We wrote things like URA Bastard, Go T. Hell, etc. and many others too dirty to print. Before the war in Shanghai, Tsingtao, and Chefoo, sailors used to write these things in Chinese hotel registers.

The man in charge of us was a British doctor, a Lieutenant Commander Page. He was the senior prisoner. We looked to him as our commander.

We were liberated on the 9th of

September. They put us on a train for Yokohama and from there we took a C-47 and refueled in Kwajalein, stopped in Guam for a day or so, then on to Pearl Harbor. From Hawaii we took a flying boat to Alameda [CA].

There were no parades. By then the novelty was over. We just blended in with everybody. We’d go to a restaurant and hear people complain that they hadn’t had any butter or sugar. We’d tell them, “You should have been where we were,” or we’d simply walk out.

### Mission of Mercy

*Near Kobe, at a camp called Maruyama, LT Ferdinand Berley feared that help would not arrive soon enough to save his sick and starving patients. He and two of his comrades took matters into their own hands.*

We heard the fleet was coming in on the 27th of August to meet for the surrender. Murray Glusman, Stan Smith, and I then got the bright idea that we would go to Yokohama or Tokyo to meet the fleet. We thought our own people would never know where we were. So we got a list of all the patients and one afternoon we just took off.

We didn’t have much in the way of clothes. I borrowed a hat from John Bookman and I had a khaki shirt with a Marine Corps insignia on it. We had our wallets, we had money, and we went down to the Kobe station and bought tickets to Tokyo. We went up to the platform and every time a train came by I’d ask if that train was going to Tokyo or Yokohama, and the answer was no. Kids came up to us and said “baseball” and things like that. It was very friendly.

But we were getting nowhere until finally a very nice gentleman with a briefcase came to us and spoke English. He introduced himself and asked us what we were trying to do.

We explained that we were on a mission of mercy. We were from a hospital that had been burned out. We had no medicine and we were trying to get to Tokyo to report our plight. He told us to come with him on the next train and he would show us how to get where we wanted to go.

The next train came along and we sat down together. He took a peach for each of us from his briefcase and told us how glad he was that the war was over and that we could be friends again. When we got to Osaka he went to the train stationmaster, explained who we were and where we were headed. The trainmaster told us to get up on the station above and he would let us know when the train came in.

The station was full of Japanese soldiers and marines all heading home. When a train came in they climbed over one another through the windows and doors to get a seat. They just mobbed the train. And then the train would take off. Another would come and the same action would be repeated. Finally, after waiting an hour or two the stationmaster told us the next train coming in would be the one to take us to Yokohama, and then from Yokohama we should take the electric to go to Tokyo.

When the train came in we shouldered our way in there just like the Japs. I found myself sitting next to a Japanese marine. He was as happy as all of us to get out because the war was finished. This fellow had a few hard biscuits which he shared with me.

As we traveled along through the night you couldn’t see very much but as the morning came on there was destruction in every town we went through.

When we got to the bay just before Yokohama, I could see our fleet out there. And that’s when I almost broke down and started crying. Goodness, what a beautiful sight that was!





Three pharmacist's mates captured by the Japanese during the invasion of Guam in 1941 discuss their experiences with the crew of an evacuation plane as they prepare to leave Japan.

When we got to Yokohama we got off the train. I remember how the people stared at us, their mouths open. We followed the directions and took the electric [train] to Tokyo. I had been there before the war and the only place I knew was the Imperial Hotel.

When we got off the electric, we started walking. Then a Japanese army truck came by and we bummed a ride. We told them we wanted to go to the Imperial Hotel and so they took us there. It's almost unbelievable when I stop and think about it.

Part of the Imperial Hotel was burned. But the destruction in the area of Tokyo we were in was no-

where near what we had seen in Kobe, Nagoya, Osaka, and all those places. They were just rubble, whereas Tokyo was not. A lot of buildings were still standing.

We went into the hotel men's room down below to clean up a bit. Then we went to the desk. I'll never forget that guy's face when we said we wanted a room. He asked us who we were and we said we were doctors from Kobe International POW Hospital. He directed us up to the mezzanine to sit. While we were sitting there a Japanese major came by who spoke English and he asked us what we were doing there. I told him we

were on a mission of mercy because we had 120 sick patients in a place called Maruyama with no food and no medicine and they were dying one after another. We had come to meet the fleet and tell them of our plight.

They gave us two rooms in the basement and put a guard over us. He was a young Japanese who spoke perfect English and had been studying to be a teacher. We learned a lot from him about what would have happened had the landings taken place. He told us they had stashed away many planes for kamikazes. They had 10,000 volunteers who were going to act as human torpedoes and blow themselves up against the landing craft. Nobody had ever invaded Japan and we were not going to do it. Every Japanese would fight to the death. And that meant that all of us would have been killed too. He was very happy the war was over and he could go to visit America one day.

We had beds, we had sheets, we had meals, we had knives and forks and napkins. We had showers, we had soap. And they sent one person after another from the Kempe [Kempetai (secret police)] to interrogate us. The Kempe wanted to know how we got there and how we were able to get there without being killed. And we refused to go back until we could meet someone who represented the American government.

Our interrogator was very, very haughty. As a matter of fact, Murray Glusman got up and pointed to him and said, "Look, you are no longer the victor, you are the defeated. You do not talk to us in that tone of voice anymore. We will have you shot."



And the guy turned white and walked out. Outside, Navy planes were flying over almost at treetop level.

Finally the Foreign Office took over from the army and the Kempe and they agreed to take us to the Swiss Embassy. We met with the Swiss delegates and turned over the patient list. They promised they would give it to the proper authorities. The fleet had been delayed in coming in for the surrender signing because of a typhoon and so we didn't get a chance to go out to the fleet. And, I'm sure the Japanese didn't want us to meet anybody from the fleet.

We then agreed to go back to Maruyama. The next day with a young Kempe as our escort, we boarded a train back. He got on and kicked people out of their seats so we could sit.

When we got back to Osaka, the place was bustling! There was so

much activity, such excitement, I just couldn't sleep. They now had *Life* magazines, food, all sorts of things. Stan, Murray, and I were in such a state of mind, we just couldn't settle down. We tried to rest up on the roof and perhaps catch a little sleep up there.

While we were there we met a young Russian fellow who could speak very good English. I told him I wanted to get back to the hospital at Maruyama to see what had happened there. He was able to commandeer a car taken from some Japanese civilian and drove us to Maruyama. The camp was deserted but for a few cooks, as I recall. "Where were the patients," we asked. They told us that ambulances had taken them to the Osaka Red Cross Hospital, which was still standing.

About the 27th or 30th of August we got to the Osaka Red Cross Hospital. All the patients were in beds with

sheets and mattresses. They had Japanese nurses taking care of them. Our planes had located where we were and were dropping supplies.

Soon we were taken to the train station and sure enough, they had several sleeper cars with berths. All the patients were then loaded in these bunks and we took off for Yokohama. I said goodbye to the others, wondering if I would ever see them again.

On the train to Yokohama, we were so excited we couldn't sleep. There was a reporter who got hold of me and started asking me a lot of questions. Did I know who Frank Sinatra was? Did I know about this and that? Of course, I didn't. I didn't know half the things that had happened the last 4 years.

When we pulled into the station at Yokohama, I looked out the window and lo and behold, there was Admiral



**Left:** Returning POWs arrive at Aeia Hospital, Hawaii.

[Richard E.] Byrd\* standing on the platform! Of all people! And I recognized him. I rushed out and introduced myself to him and said, "Admiral, I've got all these sick POWs. Would you mind coming on the train and just walking through. I know they'd just love to see you. He came aboard and shook hands with every one of those hundred or so men.

All the POWs were taken to various hospital ships, but we [Dr. John Bookman and four corpsmen] were directed to an LST.

We got some clean clothes, a khaki shirt, underwear, trousers, socks and shoes, shaving gear, and things like that. Then they gave us bunks down below decks someplace. We weren't in the mood to talk to anyone because it was a very, very emotional feeling we had. I remember when they had movies, I would be off crying by myself in a corner someplace. And I'm not the kind of person who cries very much.

Our LST wound up going to Guam and when we got there they drove us to the hospital. We passed a Jap POW camp and I saw these chaps sitting there looking about as healthy as all get out. I was ready to climb over the fence. You should have seen how well they were being treated!

When we got to the hospital, they gave us a cursory examination. Then I learned that Murray Glusman and the rest of the staff from the Kobe International Hospital had flown back to the States. They were already home and here we were on this LST!

Back to the ship we went and it was a long trip back home. It took us about a month. When I look back on it, that was probably a godsend. It gave me time to get my feet back on the ground, even though they were not back on the ground by a long shot by the end of the voyage. I had such a big chip on my shoulder. I even got angry in the wardroom because they served us rice. Rice of all things!

I vowed I would not turn down any speaking requests to tell people what had happened. But after a while, I found that you just couldn't dwell on all that stuff. But it took me a long time to get over it.

### **Nagasaki**

*Nurse Ruth Erickson was aboard the hospital ship USS Relief (AH-12) in Honolulu when World War II ended. She soon docked in Nagasaki, so recently devastated by the second atomic bomb.*

The doctors had gone over to the hospital there and saw those who had been injured by the bomb. They came back with all kinds of tales about burns, etc. I asked the commanding officer of the medical department if some of us could go see some of the results of such a destructive bomb. He got in touch with someone and a Japanese bus picked us up within the next few days and took us to a convent.

It was a very stately white building on the highest terraced area overlooking the city. We saw all the rubble along the way but didn't see any bodies or anything like that.

The nuns in the convent told us about the bomb. They had seen a brilliant white light. "Surely," they

thought, "this is the end of the world and that Christ was coming."

Our stay in Nagasaki was a pretty emotional time for all of us. For a 2-week period, trains came in every day with POWs and they were brought to a platform at the station, where a lot of showers were set up for them. Then they were sprayed with some kind of insecticide powder [DDT], and given a whole outfit of fresh clothes so they would feel like new people.

As they came out, we had to get some information from them to put on cards that had been printed up. I had from four to six nurses out there in the platform area. When they came by a table, they gave their names, rates, and where they were from. Some said it was the first time they had seen a white woman since becoming prisoners. Some looked bad. Others had partial limbs because of the brutal work they were forced to do. The latter had to be brought in on stretchers and put aboard the ship right away. But those who were able to walk on their own boarded smaller vessels tied alongside. When the destroyers and other small ships were filled, they went to a staging area.

With these malnourished people, diet was the most important thing. I don't remember us having to feed them intravenously or anything like that. They were ecstatic finally to be free. I remember when we had finished there and closed up the place we hoped we hadn't left anyone behind.—JKH

*This article is based on material from the BUMED Oral History Project.*

\*The famed polar explorer was also on hand for the surrender ceremonies aboard the USS *Misouri* (BB-63) on 2 Sept 1945.



# Reminiscences of Nagasaki

CAPT Freeman P. Fountain, MC, USNR (Ret.)

*PlM1c Freeman Fountain was with the 6th Marines, 2nd Marine Division on Saipan when the war ended. His unit was soon to be part of the occupation forces in Japan. Seven weeks after the atomic bombing of Nagasaki, Fountain and his comrades entered what was left of the city.*

Before we left Saipan they issued us occupational currency, but on board ship it was exchanged for Japanese yen. We also got a small, orange-colored booklet of Japanese words and phrases to use while in Japan.

We landed outside Nagasaki Harbor on 23 Sept 1945. Since our units were still virtually on a wartime footing, we all went ashore with combat gear and loaded rifles. I was with the scouts and snipers of the 6th Regiment. While in the landing boats, we saw bodies floating in the water. Even though they were bloated and floating face up we clearly recognized them as being oriental.

Upon landing, we lined up and marched to the staging area near the site of the Mitsubishi shipyard on the western side of the harbor. There were several Japanese civilian onlookers standing motionless with no facial expression.

The Bomb had destroyed the shipyard. Steel girders were standing but bent toward the sea. They resembled cornstalks after a windstorm.

Photo courtesy Dr. Freeman Fountain



Dr. Fountain

We camped there for several days and had to set up chlorinated drinking water and latrine facilities as in the field. Because there was no plumbing, we erected temporary latrines along the wharfs. Excreta would drop into the water below. Later, during the occupation, we used Japanese toilets—oval bowls recessed into the floor with a flushing mechanism at one end. Some of the marines knocked out the bottoms of chairs enabling them to sit rather than squat over the toilet.

In the early days of the occupation we lived on a bivouac status. We ate with our mess gear and dipped it into hot soapy water followed by boiling clear water. We dumped our scraps into a GI can prior to the cleaning. Frequently, there were young Japanese boys and girls



standing near the GI can holding out an empty container begging for scraps of food. The sight of hungry youths evoked sadness with all of us. I remember marines tossing chocolate candy to the children. The Japanese pronounced chocolate as "chocoletto" and said "ah-re-got-o" (thank you).

Early in the occupation, we revaccinated all our troops because there was smallpox among the Japanese civilians. Our vaccination program was successful as there were no cases of smallpox in the 2nd Marine Division. I worked in the regimental surgeon's office (6th Marines) and called in the daily sick reports to the division surgeon's office.

Prostitution was legalized in a small section of the city early in the occupation which incurred the protest of both regimental chaplains. Although condoms were available for marines going on liberty, we frequently checked the men for VD, the so-called "short-arm" inspections. There were occasional cases of gonorrhea which we treated successfully with penicillin.

We were soon granted liberty into the city. We could either walk around the bay or take a small boat across the harbor. I took the boat across and walked home. About half of Nagasaki was not harmed by the Bomb. Apparently, the high bluffs or hills deflected the blast and offered some protection.

The absence of hostility and friendliness of the Japanese people came as a total surprise to me. Gifts were exchanged frequently. An elderly man gave me an unusual souvenir, a medal he had picked up in the atomic rubble. It was later identified as a good conduct medal and was probably worn by a Japanese soldier who didn't survive the blast. Portions of it were fused by the heat. I had no way of checking its radioactivity but, years later, the activity level was about the same as the dial of a luminous wristwatch. I have that medal in a frame today.

The Japanese frequently invited us into their homes. We left our shoes outside so as not to track dirt on the floor mats. We sat on the mats and were served tea or sake. Even though I knew very few Japanese words, it was not difficult to carry on a conversation with the family. The man did most of the talking. His wife served the tea and spoke only when questioned.

There was little public display of affection among the Japanese. On the street the man walked in front, his wife behind him, and the children trailed like a flock of quail.

Many rickshaws plied the Nagasaki streets. The cost of a ride soon escalated from around 20 yen to over 200. Apparently, sailors passed out large bills freely and the Japanese soon realized they could charge more for the rides.

I purchased silk items in the shops. The merchants would bargain with us, making it fun. I also bought a pre-war U.S. Marine emblem embroidered with metallic thread on a silk background. Marines and sailors frequently used barter to purchase items in shops and from street vendors. Soap and cigarettes were much in demand by the Japanese. Tangerines were available on roadside stands.

The Japanese barber shops were outstanding. A neck and shoulder massage was part of the service. If hair did not lie flat, the barber used hot curling irons to control it. Female attendants would place one hot iron after another into his hand much like a surgeon passed instruments.

*Following occupation duty, Fountain was discharged from the Navy and then attended medical school. He then joined the Army and served as a medical officer during the Korean War. Later, he rejoined the Navy as a medical officer and treated Vietnam casualties at various naval hospitals, retiring from the Navy Reserve in 1980 with the rank of captain.*

*Because of his exposure to atomic radiation in Nagasaki, Dr. Fountain, a member of the National Association of Radiation Survivors (NARS), continues to correspond with the Navy, which is interested in monitoring veterans who had a similar exposure.*

*In 1981 he returned to Nagasaki, this time as a civilian and accompanied by his wife.*

*"I was happy to see that the scars of war were almost entirely gone. Attractive buildings replaced the devastated areas. As in Hiroshima, a small area in Nagasaki was left undisturbed as a museum site. New automobiles were everywhere. They had the appearance of having been washed and polished earlier in the day. Streetcars were still running and we rode one to the end of the line. Absent were men wearing old baggy uniforms bloused below the knees. Gone were leggings and split-toed sandals. Gone were the billed caps. Instead, men wore tailored suits. Gone too were the rickshaws—much to my disappointment. I had hoped to ride in one for old time's sake. Also missing was the sight of a family walking single file."* □



# Navy Medicine

## September-October 1945

LCDR George Martin, USNR

On 2 Sept 1945, representatives of the Empire of Japan signed the instrument of surrender on board USS *Missouri* in Tokyo Bay, formally bringing to a close the most destructive war in human history. The conflict's total cost in human life was staggering. Out of 70 million combatants, 17 million were killed. However, the devastation was not limited to armed forces; in fact, more civilians than soldiers perished. All told, the Soviet Union lost over 20 million, Germany over 4.5 million, Japan 1.6 million, France counted 600,000 lives lost, while Great Britain claimed 400,000 dead. Fatalities in China were uncountable with some estimates as high as 13 million. The United States suffered 300,000 dead, all military and equally divided between both theaters of operations.(1)

At the time of surrender the U.S. Navy had grown to a size of unprecedented proportions. More than 4 million officers and men, including 80,000 WAVES (Women Accepted for Volunteer Service) wore the Navy uniform. Fifty thousand vessels of all types, as well as 40,000 aircraft were

deployed to assist in the war effort. The Navy Department required the sum of 30 billion dollars per year to run its operation.(2)

With the war over, many military personnel looked forward to mustering out and returning home. For many others including the seriously wounded, prisoners of war, civilian casualties, and the medical personnel who cared for them, the trials of war were not yet concluded. As previously discussed (*Navy Medicine* July-August 1995), the repatriation and rehabilitation of wounded and prisoners of war was a major postwar mission of the Navy Medical Department. These duties would occupy medical personnel for many months more and, of course, the blind, crippled, maimed, and mentally scarred would have a lifetime to try to overcome their handicaps.

As horrible as the war proved to be, many medical developments arose from the carnage. Some of the most significant advances came in the fields of aviation medicine, submarine medicine, and air evacuation and transport of casualties.

Aviation medicine was a direct

product of the war effort. What was a small group of flight surgeons in 1939 had expanded to 1,200 medical officers by war's end. These men staffed over 100 aviation type ships and provided medical services for all Marine Corps units. Their record of sacrifice is borne out by the fact that the death rate for flight surgeons was two and a half times higher than any other group of medical officers.(3) Naval aviation met its challenge in the Pacific Theater of Operations which provided a wide array of combat scenarios. The possibility of being shot down in the vast expanses of the Pacific Ocean and facing climatic differences presented by the temperate South Seas as compared to the frigid latitudes of the Aleutians required the development of better flying clothing for survival and a more effective program of sea/air rescue. Also, a realistic, medically supervised rotation policy was needed to keep morale high and transfer weary pilots out of the combat area. Medical screening was implemented to dispose of incompetent or physically depleted personnel. The Medical Department employed new psychological techniques to root out unsatis-





**Left:** Air evacuation was a successful byproduct of World War II. **Below:** Navy flight nurses in training learn to board an inflated life raft at NAS Alameda, CA.



at NAS Alameda, CA. These flight nurses provided invaluable service during the height of the island hopping campaign.

Life on board a submarine presented its own unique problems of safety, sanitation, and hygiene. Even though the submarine was deployed as a weapon during the First World War, there were only a handful of Navy medical officers who were qualified in submarine medicine in the 1930's. These men had expertise in deep sea diving and were familiar with submarine construction and operation, as well as underwater escape and salvage. At the outbreak of war, facilities to train officers in submarine medicine were activated at the Deep Sea Diving School, Washington, DC, and Submarine Base, New London, CT.(6) Because these early courses proved to be inadequate, in June 1943 the course was extended 3 weeks and included "tank instruction and escape, inspection and instruction trips on submarines, dark adaptation instruction, and similar matters," as well as "demonstration of diving equipment, lectures, and demonstrations and participation in the submarine personnel and sound listening personnel selection program.(7) By March 1944 formal qualification in

factory aviators. In May 1944 the Navy established a Physiological Test Center at the Naval Air Test Center, Patuxent River, MD. The program was headed by flight surgeons and physiologists who flew planes in the conduct of their tests.(4)

Extensive altitude training programs, which included low-pressure chambers, were established. Under the direction of flight surgeon administration there were many new programs for the training of aviation medical technicians, low-pressure chamber technicians, and medical personnel in sea/air rescue units. Training aids were created and manu-

als developed to assist pilots in survival techniques.(5)

As planes flew faster and higher, combat aerobatics became more sophisticated. This led to the serious problem of "blackouts." Navy medicine took the lead in the development of the "anti-blackout" suit. Similarly, the movement toward night fighting created the need for the Navy's night vision training program for combat pilots.

The intensity of the Pacific campaign required the development of airborne evacuation of wounded troops. In December 1944 a school for the training of flight nurses opened

submarine medicine became a prerequisite for submarine force assignment.

At the beginning of the war Hospital Corps personnel received rudimentary training for the submarine service at New London. However, it became apparent that these young men had not been adequately prepared for the arduous tasks ahead. Therefore, in June 1943, a pool of corpsmen enrolled in the "school of pharmacist's mates entering the submarine service," which provided both necessary initial as well as periodic refresher training. The school presented a 6-week curriculum including didactic and practical instruction in first aid, minor surgery, hygiene, sanitation, toxicology, anesthesia, pharmacy, chemistry, and indoctrination in environmental factors of life on a submarine. The submarine's pharmacist's mate was a critical component in the success of the mission. As the only medical person on board he was responsible for the health and welfare of the crew. A typical cruise could present the problems of crushed fingers, broken ribs and limbs, dislocations, bruises, lacerations, eye injuries, gastrointestinal disorders, and appendicitis. In addition to meeting these dilemmas the corpsman was expected to take his place among the ship's crew and perform operational duties such as sonar operator, radarman, lookout, and librarian.

Navy Medical Department personnel were responsible for providing both pre-patrol and post-patrol examinations of all officers and men assigned to the submarine force. Candidates received complete physicals which included chest X-rays and com-

plete dental exams. The pharmacist's mate on board the vessel kept records on each man's physical condition.

Because of the stress of undersea warfare, special intelligence and psychological tests were administered in the initial personnel selection phase. At first this was a very disjointed process earmarked by a lack of standardization and professional cooperation between units, and where corpsmen with no training in psychiatry examined recruits. By 1943 a traveling "Interview Board" began visiting various indoctrination units. In cooperation with the local medical departments they interviewed candidates and decided on the desirability of each man for submarine duty. These and other measures greatly streamlined the selection process and were instrumental in the low psychiatric attrition rate among submariners during the war.

As the war progressed, the Medical Department became involved in a number of issues of submarine medical treatment and research. Studies were conducted and recommenda-

tions made in such areas as overcrowding, protective clothing, food and water supply, toxic gases, length of operations, sanitary tank-head systems, oxygen depletion, skin diseases, night vision testing, lookout training, sonar training, and escape "lung" training. There is little doubt that the success of the U.S. submarine effort in World War II and the development of today's strategic force would not have been possible without the dedication and expertise of the Navy Medical Department.

World War II saw the development of air evacuation and transport of sick and wounded. The excellent military medical evacuation system of our modern force traces its lineage to this era. Early in the war, American observers took interest in the efforts of Germany and Russia, who pioneered airborne operations. By the beginning of the war the Bureau of Medicine and Surgery (BUMED) cooperated with the Bureau of Aeronautics to procure specially equipped ambulance planes for air evacuation. The factors that contributed to the

The war also brought about advances in tropical medicine. Here, an entomological technician inspects a village for mosquitoes on Espiritu Santo.







Naval Medical Research Unit No. 1 worked throughout the war studying diseases and their prevention. Here, a chief pharmacist's mate draws influenza-infected yolk from an egg in an effort to develop an effective serum against the disease.

reduction of mortality from wounds and supported the use of air evacuation were:

- (1) Immediate first aid treatment.
- (2) Prompt treatment of shock and control of hemorrhage.
- (3) Earliest possible evacuation of patients for definitive treatment.(8)

Originally, aerial transportation was the purview of local commands, but it was the major action at Guadalcanal that demonstrated the need for a centralized authority. At Guadalcanal often there were no medical personnel available for evacuation aircraft or for supervising the loading of casualties. Moreover, there were no facilities for the handling of patients at unloading terminals. By November 1942 a sufficient number of medical personnel were available to permit doctors to ride planes carrying seriously wounded while corpsmen were assigned to air transports carrying less serious cases.

Task force commanders and the commander, forward area, divided responsibility for air evacuation of

combat casualties. This inefficient arrangement existed until the Air Evacuation Service was established under the auspices of BUMED. The service moved toward "jointness" in October 1942, when the Army participated with Marine Air Group 25 in the South Pacific.(9)

As the war progressed the efficiency of air transport increased and was responsible for the saving of many wounded who otherwise would probably not have survived. General orders standardized evacuation procedures. It became policy that hospital receiving units establish facilities and detail personnel to receive patients at airfields. Medical personnel would accompany every flight if available, flight surgeons would be detailed as loading officers, a formal flight log would be kept, and liaison corpsmen at each receiving airport would ensure the exchange of medical equipment. Between September 1942 and March 1943, 12,017 patients were evacuated by air from Guadalcanal. Nevertheless, problems were still be-

ing encountered as witnessed by the high mortality rate of patients being evacuated from the battle of Saipan. The reason was that the airlift was unplanned and was executed without the benefit of proper medical screening, necessary equipment, or sufficient numbers of medical personnel. By contrast the planned evacuations from Iwo Jima and later Okinawa were wildly successful. At Iwo Jima 2,500 casualties were airlifted with very few fatalities, and only three patients died out of over 15,000 evacuees on Okinawa.(10)

The air evacuation and transport of casualties had become a science in itself in which the many advantages significantly outweighed the disadvantage of requiring a secure airfield near the battle area. Troops transported by air had much higher morale because of their speedy removal from the combat zone. Air transport proved to be extremely flexible, being able to change schedule and destination on short notice. Patients arrived at receiving areas in smaller numbers and therefore reduced the problem of overcrowding. The numbers of medical personnel required for evacuation operations was only a fraction (approximately 10 percent) of those needed to attend to the wounded on board a hospital ship.

The aforementioned developments cover just a few major areas of the total expansion of the Navy Medical Department during the Second World War. Many other advances were made in the fields of air/sea rescue, amphibious warfare, field medicine, dentistry, medical logistics, and mobile and base hospitals.

The success of American military medicine during World War II eclipsed all previous wartime accomplishments. The Navy Medical Department expanded from 13,000 personnel in 1941 to a peak in 1945 of 169,225 men and women. The recovery rate for casualties was an astonishing 98 percent as compared to 90 percent in World War I with death from wounds of the head, chest, and abdomen, an amazing 65 percent lower than in World War I.<sup>(11)</sup> The medical advances and innovations that resulted were numerous and noteworthy. The building of new hospitals, the use of mobile hospitals at the battlefield, and the conversion of landing craft and transports as facilities for the collection and treatment of casualties were instrumental in the medical effort. The use of the hospital ship as both treatment facility and medical storage warehouse proved an invaluable asset. Measures taken for the prevention and treatment of epidemic disease, the greatest single killer of military men since the dawn of warfare saved countless lives and undoubtedly enabled the successful

conclusion of many campaigns. The war emphasized the need for specialties such as submarine, aviation, and amphibious medicine. The latter was so successful that medical care of all types was brought to the men at the front earlier than ever before thought possible. The procurement and transport of medical necessities such as drugs, vaccines, serums, surgical dressings and instruments, and hospital equipment of every kind was a feat unmatched in the annals of military history and proved to be the foundation for victory.

The continuous research carried on in the fields of surgery, physiology, psychology, chemistry, botany, bacteriology, and entomology contributed to the saving of lives of not only wounded sailors and marines but benefited future generations to come. However, all these magnificent accomplishments would not have been possible without the dedication, professionalism, and sacrifice of the doctors, dentists, nurses, and corpsmen who gave so much of themselves in the victory over totalitarianism. It is ultimately to them that this World

War II commemorative series has been dedicated.

## References

1. Pratt F. *The Compact History of the United States Navy*, p 175.
2. Taylor A. *The Second World War: An Illustrated History*, p 229.
3. *History of the Medical Department of the United States Navy in World War II: A Narrative and Pictorial Volume*, p 209.
4. *Ibid.*, p 212.
5. *Ibid.*, p 211.
6. *Ibid.*, p 42.
7. *Ibid.*, p 43.
8. *Ibid.*, p 203.
9. *Ibid.*, p 204.
10. *Ibid.*, p 204.
11. Cowdrey AE. *Fighting for Life*, p v.

## Bibliography

Cowdrey AE. *Fighting for Life*. New York: Free Press; 1994.

*History of the Medical Department of the United States Navy in World War II: A Narrative and Pictorial Volume*. Washington, DC: Government Printing Office; 1953.

Pratt F. *The Compact History of the United States Navy*. New York: Hawthorn Books Inc; 1967.

Taylor AJP. *The Second World War: An Illustrated History*. New York: G.P. Putnam's Sons; 1975. □

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## A Better Mouse Trap, Ca. 1910

The device described below was made and successfully operated on the Monterey by Machinist G.L. Russell, U.S. Navy.

The apparatus consists of a piece of dry wood one-half inch thick, 2 inches wide and long enough to extend the width of a door, resting on the sill. Upon this piece of wood is screwed two pieces of three-eighths inch copper, spaced 1 inch apart, each strip being connected, respectively, to the positive and negative electric-light wires by means of the ordinary attachment plug. The rat on entering a room must naturally step from one copper strip to the other, causing a short circuit through its body, which instantly kills it. A voltage of 110 is necessary for the successful working of this apparatus.

—Reprinted from *U.S. Naval Medical Bulletin*, Vol. 4, No. 4., Oct 1910.



## In Memoriam

**Dr. Howard G. Bruenn**, cardiologist and physician to President Franklin D. Roosevelt, died on 29 July 1995 at his summer home in Sorrento, ME. He was 90.

Born in Youngstown, OH, Dr. Bruenn graduated from Columbia University in 1925 and Johns Hopkins Medical School in 1929. He joined the Navy as a reserve lieutenant commander in 1942.

As cardiology consultant to the National Naval Medical Center, Bethesda, MD, Dr. Bruenn was assigned to President Roosevelt in the spring of 1944. He attended him during the last eventful year of his life which included yet another grueling presidential campaign, and trips to Hawaii, Quebec, and Yalta for the fateful meeting with Stalin and Churchill, and finally to Warm Springs, GA, where he attended the stricken President following his fatal stroke.

After the war, Dr. Bruenn continued a long, distinguished career at the Columbia Presbyterian Medical Center in New York.

In 1970, following a 25-year, self-imposed silence, he wrote his clinical recollections of Roosevelt's last year based on personal notes. As the oldest living medical expert on FDR's health, Dr. Bruenn granted *Navy Medicine* an exclusive interview in 1990 and, since then, agreed to other interviews in which he shed more light on the controversy relating to President Roosevelt's medical condition (see interview in *Navy Medicine*, March-April 1990).



**VADM Lewis H. Seaton**, MC (Ret.), 29th Surgeon General of the Navy, died on 20 Aug 1995 near his home in Jacksonville, FL. He was 64. Dr. Seaton, a native of western Pennsylvania, received his M.D. degree from the University of Pittsburgh in 1955 before being commissioned as a lieutenant (junior grade) in the Navy. He reported to Naval Hospital San Diego, CA, for an internship which he completed in 1956. After training in radiobiology at Reed college and several federal nuclear

Franklin D. Roosevelt Library



Dr. Bruenn (right) in 1944

facilities, he participated in nuclear weapons testing operations at the Nevada Test Site in 1957. Later that year, after graduating from Deep Sea Diving School and Submarine School, he reported for submarine duty as the squadron medical officer of Submarine Squadron Five.



Dr. Seaton

Dr. Seaton received training at the Nuclear Power Training Unit and was then assigned to the precommissioning detail of USS *Seadragon* (SSN-584), serving during its historic polar cruise in August 1960. He then reported to the precommissioning detail of the Navy's first nuclear-powered aircraft carrier, USS *Enterprise* (CVN-65), where his sea duty included the quarantine of Cuba in 1962. VADM Seaton returned to submarine duty in 1963 and served successive tours as the medical officer with Submarine Flotilla Six and with Submarine Squadron Sixteen on its initial deployment to Spain.

After completing his ophthalmology residency at the National Naval Medical Center, Bethesda, MD, in 1967, he served as chief, ophthalmology service and director of interns at Naval Hospital Jacksonville, FL, until 1973. He then returned to the National Naval Medical Center as chairman of the Department of Ophthalmology.

In July 1977 Dr. Seaton assumed command of the Naval Submarine Medical Center, Groton, CT, and was promoted to flag rank on 1 May 1980. He then assumed duties as Fleet Surgeon of the Pacific Fleet and Command Surgeon of the Pacific Command. Upon completion of that tour, he reported to the Bureau of Medicine and Surgery as Assistant Chief for Health Care Programs. He assumed command of the newly established Naval Medical Command in 1982 and remained there until nominated and confirmed to become Surgeon General of the Navy in 1983.

Promoted to vice admiral, Dr. Seaton also assumed the title of Director of Naval Medicine. He served until 1987. During his tenure, he oversaw construction and delivery of two new hospital ships, USNS *Mercy* and USNS *Comfort*. □

# Naval Medical Research and Development Command Highlights

## ●Advanced Color Night Vision Goggles

The achromatic imagery of the night vision goggles currently used by pilots during night operations is less than adequate in very low light/starlight conditions. This could result in pilot disorientation and lead to aircraft mishaps. Responding to this situation researchers at the Naval Postgraduate School, Monterey, CA, and the Naval Aerospace Medical Research Laboratory, Pensacola, FL, are developing an advanced technology demonstration of a color solid state vision system for aircraft. This new system will fuse visible light imagery from a low light charge coupled device (LLCCD) with infra-red thermal imagery from a forward-looking infrared sensor to produce the first color night display. This will be displayed through an aircraft color monitor or through a helmet mounted display. The long-term goal of this project is to incorporate the technology into a variety of military platforms ranging from unmanned air vehicles to tanks, to ships, to aircraft. This system will be a quantum leap forward in night operations and will significantly reduce night operation aircraft mishaps. Potential civilian applications include rescue operations and police surveillance.



## ●Patent for Critical Care Unit in Hyperbaric and Recompression Chambers

Because of the many advances in diving equipment and procedures over the past 10 years, military and civilian diving is safer. However, it is still possible for a diver to experience a serious injury requiring advanced life support and recompression therapy. Most recompression chambers located close to sites where divers are working or recreating do not have advanced medical equipment to provide artificial ventilation or monitor vital signs. Working to resolve this problem, investigators at the Naval Medical Research Institute, Bethesda, MD, developed and received a patent on a

portable critical care system for use in hyperbaric and recompression chambers. The critical care unit increases the level of available life support for an injured diver who requires advanced care in an older model decompression or hyperbaric chamber not equipped with treatment equipment. The 70-pound self-contained, rapidly transportable unit contains a ventilator, patient suction, and vital signs monitor that can operate without creating heat, sparks, or other hyperbaric hazards. The alternative method to achieve this level of care would be to modify existing chambers which would be very expensive, take many years, and require recertification of all modified chambers.



## ●DNA Vaccines for Complex Multistage Organisms

Mission-specific medical research on infectious diseases continues to be one of the Navy's highest priorities. Deployed personnel can be exposed to endemic diseases rarely encountered by physicians in the United States. The technique of DNA immunization has the potential to revolutionize the development and fielding of vaccines. Scientists at the Naval Medical Research Institute (NMRI), Bethesda, MD, will begin to develop DNA vaccines that protect against complex, multistage microorganisms like malaria. Malaria vaccines will be the model to prove the principles that such vaccines can protect against infectious diseases. NMRI scientists reported the first successful use of DNA vaccines against a nonviral infection. They used a single gene to protect mice against a highly virulent *P. yoelii* infection, a microorganism with a complex, multistage life cycle.

For more information on these and other research efforts contact CAPT T.J. Singer, MSC, Director, External Relations, at DNS 295-6182, Commercial 301-295-6182, FAX 301-295-4033, or E-mail RDCO3@NMRDC1.NMRDC.NNMC.NAVY.MIL.



## Navy Medicine 1952



LT Betty Rupert, NC, helps feed children  
at an Italian orphanage in Afragola, Italy.

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